



AMC308/318/328

Eight-Port T1/E1/J1 Communications Controller
AdvancedMC™ Modules
User's Guide

Document Revision History

Date	Explanation of Changes
July 19, 2010	Initial Release of Production Manual
January 28, 2011	Updated description and pinout table for "Console Cable," on page 69.

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Symbol Conventions

The following symbols appear in this document:



Caution:

There is risk of equipment damage. Follow the instructions.



Warning:

Hazardous voltages are present. To reduce the risk of electrical shock and danger to personal health, follow the instructions.

Electrostatic Discharge



Caution:

Electronic components on printed circuit boards are extremely sensitive to static electricity. Ordinary amounts of static electricity generated by your clothing or work environment can damage the electronic equipment. It is recommended that anti-static ground straps and anti-static mats are used when installing the module in a system to help prevent damage due to electrostatic discharge.

Additional safety information is available throughout this guide.

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Overview

This manual describes the hardware-specific functionality and usage of the PT's AMC308/318/328 eight-port T1/E1/J1 Communications Controller AdvancedMC™ (AMC) module (referred to as the AMC308 in this manual).

Note: *The instructions and information provided in this manual apply to the AMC308, AMC318, and the AMC328 modules. When values or functions differ for each module, they are noted. For more information about the differences between these models see “Product Description,” on page 16.*

This manual includes installation and configuration information, plus a functional block description, intended for the application developer of this module. Here is a brief description of what you will find in each chapter:

Chapter 2, “Introduction,” on page 15 provides an overview of the AMC308 and includes information such as module features, front panel details, functional block diagram with a brief description of each block, and descriptions of software such as the supported operating systems.

Chapter 3, “Getting Started,” on page 31 provides setup information and includes information such as unpacking the AMC308, system requirements, configuration and installation.

Chapter 4, “System Monitoring and Alarms,” on page 37 describes the commands supported by the on-board Module Management Controller (MMC), supported commands, sensor thresholds, serial interface subsystem, and firmware upgrade process.

Chapter 5, “Connectors,” on page 63 provides connector location, description, and pinout information for the AMC308.

Chapter 6, “Specifications,” on page 77 contains electrical, environmental, and mechanical specifications as well as reliability data.

Chapter 7, “Agency Approvals,” on page 81 presents agency approvals and certification information.

Chapter 8, “Data Sheet Reference,” on page 85 provides information on data sheets, devices, standards, specifications, and documentation for the technology designed into the AMC308.

The AMC308 assembly should be used in conjunction with the PT software package that you have chosen, for example NexusWare® Core.

The most current documentation to support the additional components that you purchased from PT is available at <http://www.pt.com> under the product you are inquiring about.

Text Conventions

This guide uses the following text conventions:

Convention	Used For
Monospace font	Monospace font represents sample code
Bold font	Bold font represents: • Paths • File names • UNIX commands • User input
<i>Italic font</i>	Italic font represents: • Notes that supply useful advice • Supplemental information • Referenced documents

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1. **EMAIL** (Preferred Method) – Email us at the addresses listed below or use our online email support form. Outline your problem in detail. Please include your return email address and a telephone number.
2. **TELEPHONE** – Contact us via telephone at the number listed below, and request Technical Support. Our offices are open Monday to Friday, 8:00 a.m. to 8:00 p.m. (Eastern Time).

PT Support Contact Information

	Embedded Systems and Software (Includes Platforms, Blades, and Servers)	SS7 Systems (Includes SEGway™)
Email	support@pt.com	ss7support@pt.com
Phone	+1 (585) 256-0248 (Monday to Friday, 8 a.m. to 8 p.m. Eastern Time)	+1 (585) 256-0248 (Monday to Friday, 8 a.m. to 8 p.m. Eastern Time)

If you are located outside North America, we encourage you to contact the local PT distributor or agent for support. Many of our distributors or agents maintain technical support staffs.

Customer Support Packages

Our configurable development and integration support packages help customers maximize engineering results and achieve time-to-market goals. To find out more about our Customer Support packages, visit <http://www.pt.com/page/support/>.

Other Web Support

Support for existing products including manuals, release notes, and drivers can be found on specific product pages at <http://www.pt.com>. Use the product search to locate the information you need.

Return Merchandise Authorization (RMA)

To submit a return merchandise authorization (RMA) request, complete the online RMA form available at <http://pt.com/assets/lib/files/rma-request-form.doc> and follow the instructions on the form. You will be notified with an RMA number once your return request is approved. Shipping information for returning the unit to PT will be provided once the RMA is issued.

Product Warranty

Performance Technologies, Incorporated, warrants that its products sold hereunder will at the time of shipment be free from defects in material and workmanship and will conform to Performance Technologies' applicable specifications or, if appropriate, to Buyer's specifications accepted by Performance Technologies in writing. If products sold hereunder are not as warranted, Performance Technologies shall, at its option, refund the purchase price, repair, or replace the product provided proof of purchase and written notice of nonconformance are received by Performance Technologies within 12 months of shipment, or in the case of software and integrated circuits within ninety (90) days of shipment and provided said nonconforming products are returned F.O.B. to Performance Technologies's facility no later than thirty days after the warranty period expires. Products returned under warranty claims must be accompanied by an approved Return Material Authorization number issued by Performance Technologies and a statement of the reason for the return. Please contact Performance Technologies, or its agent, with the product serial number to obtain an RMA number. If Performance Technologies determines that the products are not defective, Buyer shall pay Performance Technologies all costs of handling and transportation. This warranty shall not apply to any products Performance Technologies determines to have been subject to testing for other than specified electrical characteristics or to operating and/or environmental conditions in excess of the maximum values established in applicable specifications, or have been subject to mishandling, misuse, static discharge, neglect, improper testing, repair, alteration, parts removal, damage, assembly or processing that alters the physical or electrical properties. This warranty excludes all cost of shipping, customs clearance and related charges outside the United States. Products containing batteries are warranted as above excluding batteries.

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Overview

This chapter provides a brief introduction to the AMC308 and AMC318 T1/E1/J1 communications controllers, and the AMC328 Voice and Media Processor, shown in [Figure 2-1, “AMC308/318/328 Eight-Port T1/E1/J1 Communications Controller,” on page 17](#). It includes a product definition, a list of product features, a figure showing the product's front panel, a functional block diagram, a description of each block, and information about the software supported on the product.

Unless otherwise specified, when this manual refers to the AMC308, it is also referring to the AMC318 and AMC328. Information specific to the AMC318 and AMC328 is clearly indicated as such.

Information about unpacking, installing, initial module configuration and other setup information is provided in [Chapter 3, “Getting Started,” on page 31](#).

Key topics in this chapter include:

- “Product Description,” on page 16
- “Features,” on page 17
- “Front Panel,” on page 19
- “Functional Blocks,” on page 20
- “Software,” on page 29

Product Description

The AMC308 module is an eight-port T1/E1/J1 communications controller in a single, mid-size AMC form factor for AdvancedTCA® and MicroTCA™-based systems. The AMC308 is powered by a Freescale® MPC8568 PowerQUICC™ III processor to deliver high-performance and high-capacity processing of signaling traffic. The module supports simultaneous communications on eight T1/E1/J1 lines, as well as support for high-performance PCI Express® interfaces (AMC.1) and Gigabit Ethernet (GbE) (AMC.2) interfaces.

Support for telecom clocks TCLKA, TCLKB, and TCLKC is included on the module.

The memory on-board the AMC308 includes:

- Flash memory for boot code and application storage (256 MB)
- DDR2 SDRAM with ECC (512 MB)
- Serial EEPROM (64 KB)

The module is compliant with the PCI Industrial Computer Manufacturers Group (PICMG)® AMC.0 specification and adheres to mechanical, power, thermal, interconnect, and management functions defined in this specification.

I-TDM Support (AMC318 Only)

Specific to the AMC318 is the ability to transmit Time-Division Multiplexing (TDM) traffic over I-TDM, allowing the module to transmit TDM traffic to other modules via the I-TDM interface over Ethernet. The AMC318 includes field-programmable gate array (FPGA)-based support for TDM switching and I-TDM protocol conversion, and can be used for full capacity media termination and media switching applications. For more information about the FPGA and I-TDM, see [“I-TDM \(AMC318 Only\),” on page 25](#).

The AMC308 and AMC328 do not support I-TDM.

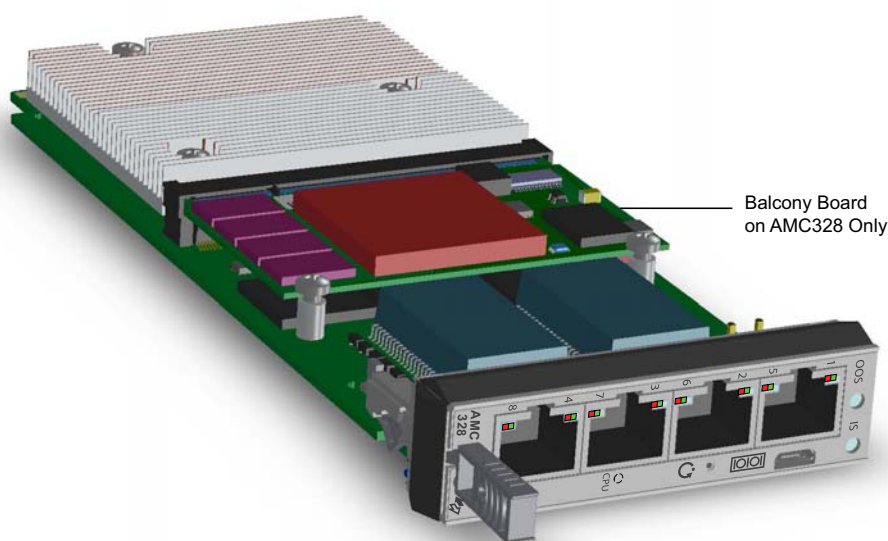
Voice Processing Support (AMC328 Only)

The AMC328 includes a balcony board that features the Centillium Communications Entropia™ III, VoIP System on-Chip Processor, allowing the AMC328 to specialize as a Voice and Media Processor. This functionality is fully supported by all PTI software.

Software

The modules support PT's NexusWare® software suite, a highly integrated, CGL Registered, and POSIX-compliant Linux® operating system and development environment that features a graphically integrated toolset. In addition, the suite includes an extensive list of installable protocol packages (such as NexusWare WAN, SIP, and C7) that can be leveraged to build robust solutions such as WiMAX, media gateways, managed WAN gateways, VoIP, lawful intercept, radar servers, signaling gateways, and base station controllers. See [“NexusWare Software Support,” on page 29](#) for more information.

Figure 2-1: AMC308/318/328 Eight-Port T1/E1/J1 Communications Controller



Features

The AMC308 supports the following features:

Processing Power and Memory

- Freescale MPC8568 PowerQUICC III processor @ 1 GHz
- 512 MB DDR2 SDRAM with ECC (up to 1 GB)
- 256 MB of 8-bit flash EPROM

T1/E1/J1 Line Framing

- Eight individual front-access T1/E1/J1 lines using standard RJ48C connectors
- OCTALFALC™ T1/E1/J1 framers with integrated Line Interface Unit (LIU) supporting long or short haul interfaces, AMI, HDB3, or B8ZS line coding and various superframe formats
- One green/red bicolor LED per T1/E1/J1 line

PCI Express Interface

- x4 PCI Express lane on AMC ports 4-7 (AMC.1 Type 4)
- PCI Express 100 MHz clock input on AMC FCLKA

Ethernet Interfaces

On-board Gigabit Ethernet switch with six ports connected as follows:

- Two Gigabit Ethernet links on AMC ports 0 and 1, supporting Type E1 and Type E2 connectivity
- On-board Ethernet switch interconnecting several module resources including:
 - Two MPC8568 eTSEC ports
 - iTDM FPGA Ethernet port (AMC318 only). See [“I-TDM \(AMC318 Only\)” on page 25](#)
 - Balcony voice processor Ethernet port (AMC328 only). See [“Voice and Media Processing DSP Card \(AMC328 Only\)” on page 22](#)

Telecom Clock Management

The module supports reporting of telecom clock capabilities through the E-Keying process. Actual control of the clock interconnect is under the NexusWare Board Clocking API. Please refer to the *NexusWare Core Reference Guide* for more information.

- The module supports three telecom clock synchronization modes:
 - Internal free running based on an on-board Stratum 3 source
 - Recovered line clock synchronization
 - AMC platform telecom clock synchronization via TCLKB
- Primary and secondary synchronization clock inputs from multiple sources
 - Any line interface recovered clock
 - AMC backplane telecom clock TCLKA or TCLKC
 - On-board Stratum 3 source
- Synchronized clock output to AMC telecom clock TCLKB
- Loop timing available on each individual line interface port

Module Management

- System management bus
- Payload reset control
- Voltage and temperature monitoring
- Hot-swap events handling
- LEDs — hot-swap LED (blue), out-of-service LED (red), in-service LED (amber/green)
- Communication with the MPC8568 through a UART link
- One external RS232 port shared and switchable between the MPC8568 and the system management controller

Other Features

- One user-programmable bicolor amber/green LED on the front panel (CPU controlled)
- Embedded power-on self test
- One MPC8568 JTAG / COP header on the module for development
- Supports NexusWare Core Carrier Grade Linux (CGL) OS and development environment
- Supports NexusWare WAN protocol communications software including HDLC, X.25, and Frame Relay

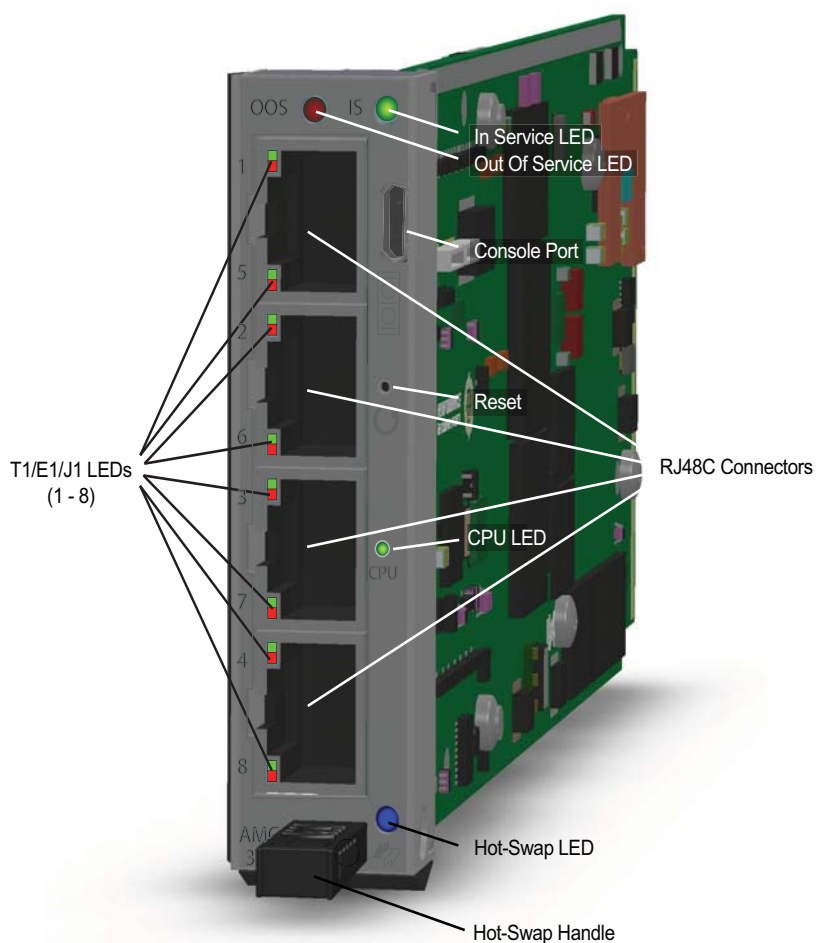
- Supports NexusWare C7, MTP2 installable package
- Supports NexusWare SIP, Session Initiation Protocol Stack
- PICMG AMC.0, R 2.0 compliant
- IPMI v1.5 specification compliant
- RoHS compliant

Front Panel

The front panel of the AMC308, shown in [Figure 2-2, “AMC308 Front Panel,”](#) contains the following elements:

- Four standard RJ48C connectors each carrying two T1/E1/J1 lines. See [“Front Panel Connectors,”](#) on page 68 for more information about these connectors.
- Eight T1/E1/J1 LED indicators. See [“LED Indicators,”](#) on page 28 for more information.
- Four additional LED indicators: out-of-service (OOS), in-service (IS), CPU (CPU), and hot-swap. See [“LED Indicators,”](#) on page 28 and [“Hot-Swap LED,”](#) on page 29 for more information.
- An insert/extraction (hot-swap) handle.

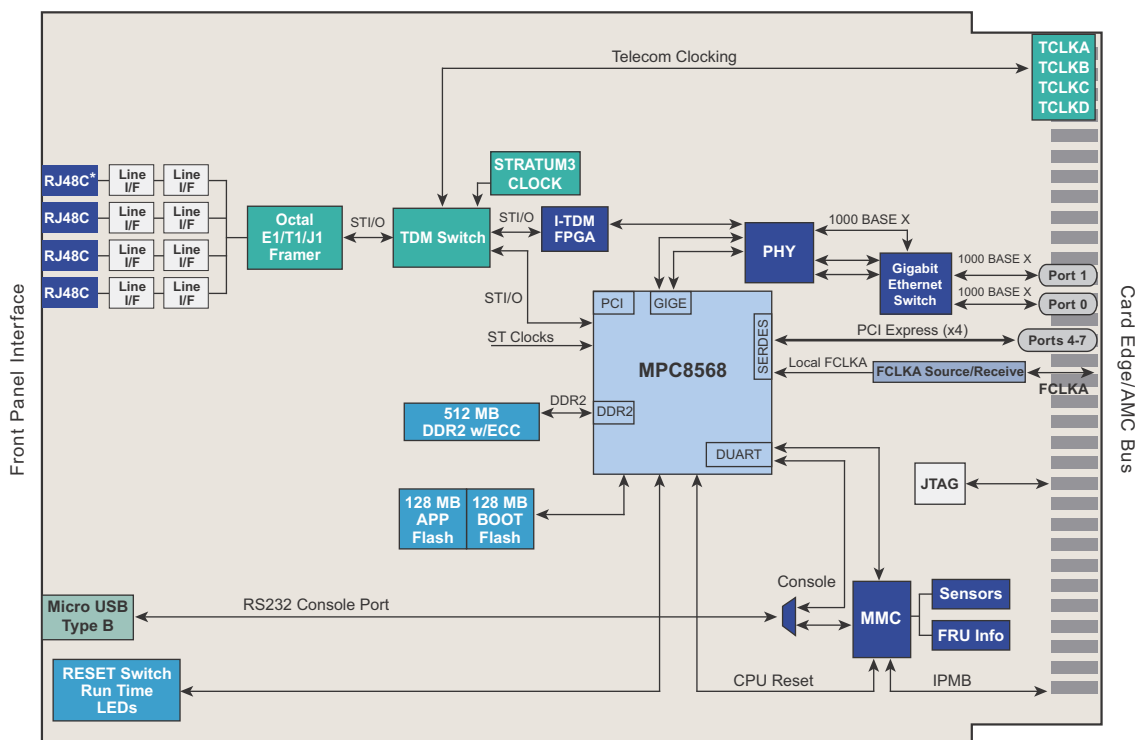
Figure 2-2: AMC308 Front Panel



Functional Blocks

<Hypertext>Figure 2-3 presents a functional block diagram of the AMC308, with blocks showing additional AMC318 and AMC328 functionality.

Figure 2-3: AMC308 Functional Block Diagram



*Note: Each RJ48C carries two T1/E1/J1 interfaces

The following topics provide overviews for each major block on the AMC308.

- “Freescale MPC8568 PowerQUICC III Processor,” on page 21
- “TDM Switch, TDM Manager, and DPLL Clock Source,” on page 22
- “Voice and Media Processing DSP Card (AMC328 Only),” on page 22
- “PCI Express Interface,” on page 22
- “Ethernet Interfaces,” on page 23
- “Memory,” on page 24
- “OCTALFALC T1/E1/J1 Framer,” on page 25
- “I-TDM (AMC318 Only),” on page 25
- “AMC Interface,” on page 27
- “Module Management Controller,” on page 27
- “LED Indicators,” on page 28

Freescape MPC8568 PowerQUICC III Processor

The AMC308 features Freescape's MPC8568 PowerQUICC III processor (referred to as the MPC8568 in this manual). The main features of the MPC8568 are:

- PowerPC e500 core at 1 GHz
 - Dual (Instruction / Data) 32 KB Level 1 cache
 - 512 KB Level 2 cache
- QUICC Engine
- Dual 10/100/1000 Mb Ethernet Controllers (eTSEC) with TCP/IP acceleration and classification capabilities
- 32-bit PCI Controller
- x4 PCI Express Interface
- DDR2 SDRAM Controller

The QUICC Engine module provides termination (involving CPU processing on a per-packet basis for transferring data from one interface to another), interworking (ability to transfer payloads from one protocol and/or physical interface to another without CPU intervention) and switching functionality between a wide range of communications protocols that include Ethernet (IP), ATM HDLC, and TDM without CPU intervention. The QUICC Engine module improves throughput, minimizes latency and jitter, and improves headroom in the CPU for other application functionality.

See [“MPC8568 PowerQUICC III Processor,” on page 86](#) for links to additional information and related documents for this device.

Interrupts

The peripherals can generate interrupt requests to the Programmable Interrupt Controller (PIC) of the MPC8568. The interrupts are level-sensitive, active low. See [Table 2-1](#) below.

Table 2-1:Interrupt Requests

MPC8568 Interrupt (PIC)	IT Source
IRQ0#-IRQ3#	Reserved for PCI Express INTA-INTD
IRQ4#	Octal FALC 1 Second Timer
IRQ5#	TDM Switch Interrupt
IRQ6#	MMC refocus console port Interrupt
IRQ7#	Watchdog Timer Interrupt
IRQ8#	iTDM FPGA Interrupt
IRQ9#	Balcony Card Interrupt
IRQ10#	Octal FALC Interrupt
IRQ11#	Ethernet Switch/PHY Interrupt

TDM Switch, TDM Manager, and DPLL Clock Source

The functions of on-board Time-Division Multiplexing (TDM) switch, local TDM clocking manager, and Digital Phase-Locked Loop (DPLL) clock source are performed by the Zarlink ZL50018 TDM Time Slot Interchange (TSI) device. The switch is a 2K x 2K non-blocking switch with adjustable I/O timing. The DPLL clock source meets the MicroTCA clocking and holdover requirements.

Some of the key features of the ZL50018 are:

- 2048 channel x 2048 channel non-blocking DTDM switch at 8.192 and 16.384 Mbps or a combination of ports running 8.192 Mbps
- Integrated DPLL exceeds Telcordia GR-1244-CORE Stratum 3 specifications
- Output clocks have less than 1 ns of jitter (except for the 1.544 MHz output)
- DPLL provides holdover, freerun, and jitter attenuation features with four independent reference source inputs
- Programmable key DPLL parameters:
 - Filter corner frequency
 - Locking range
 - Auto-holdover hysteresis range
 - Phase slope
 - Lock detector range
- Multiple frame pulse and reference clock output

Voice and Media Processing DSP Card (AMC328 Only)

The Centillium Entropia III provides voice and media processing for the AMC328. The Centillium Entropia III features include:

- 504 G.711 (PCM) VoIP or VoATM voice channels
- TDM, Packet, and Host (PCI) interfaces
- Extensive wireless and wireline codecs
- Echo cancellation
- Fax and modem relays
- Jitter buffer
- Telephony and class features

For more information on the Centillium Entropia III, see [“Voice and Media Processor \(AMC328 Only\)” on page 87](#).

PCI Express Interface

The PCI Express (PCIe) port is compatible with the *PCI Express Base Specification Revision 1.0a* and supports x1, x2, or x4 lane widths with each lane at 2.5 Gbaud (2.0 Gb/s). The maximum supported packet payload size is 256 bytes. The interface supports virtual channel 0 (VC0) and traffic class 0 (TC0) only. The PCIe interface can be configured by the user as a PCIe Endpoint or as a Root Complex. PCIe is configured as an endpoint by default. Enabling the PCIe port is also configurable. For more information about configuring PCIe, see [“SW1 \(PCI Express Port Configuration\)” on page 74](#).

The four PCIe lanes are routed to AMC fat pipe ports 4-7. The PCIe x1, x2, x4 ports are mapped to the MPC8568 ports, as shown in [Table 2-2](#).

Table 2-2:PCI Express Port Mapping

MPC8568 PCIe Port	AMC Fat Pipes Port
SD1{0} TX-RX	TX-RX{4}
SD1{1} TX-RX	TX-RX{5}
SD1{2} TX-RX	TX-RX{6}
SD1{3} TX-RX	TX-RX{7}

On boot up, all four lanes are initially enabled but the actual number of connected links is determined by the link negotiation process. The results of the e-keying process inform the MPC8568 of the maximum number of PCI Express lanes to be enabled for a specific installation.

Since the PCI Express port SD1 on the MPC8568 always comes up enabled, it must be supplied a clock source. The choice of clock sources is normally made by the MMC through e-keying with the AMC/ATCA shelf controller. After CPU initialization, the port can be disabled with CPU-controlled registers if the system administrator desires.

Ethernet Interfaces

There are two externally accessible AMC.2 R1.0 compliant Gigabit Ethernet ports on the AMC308. The ports map to the AMC common options port 0 and port 1 and support Type E1 and Type E2 connection. The ports are internally connected to a Broadcom BCM5389 8-GbE port switch with an integrated SerDes. The Broadcom switch allows several internal devices access to the backplane ports. All of the on-board devices interconnect to the Broadcom switch through a Broadcom BCM5466 PHY which converts their native RGMII interface to 1000 BASE-X.

Six of the eight available BCM5389 Gigabit ports (ports 0-5) are connected on the board as shown in [Table 2-3, “Ethernet Switch Port Map,” on page 24](#). The following points apply to the switch ports:

- All of the switch ports are implemented as 1000 BASE-X.
- As previously mentioned, two of the BCM5389 ports (ports 0 and 1) are connected to the AMC backplane's 1000 BASE-X ports 0 and 1.
- Two of the ports (ports 2 and 3) service the MPC8568's eTSEC ports.
- One switch port (port 4) is connected to the iTDM FPGA. This path is primarily used for the transport of TDM data to and from the AMC backplane fabric. See [“I-TDM GbE Link \(AMC318 Only\)” on page 24](#).
- The remaining port (port 5) services the balcony board. See [“Voice Processing Support \(AMC328 Only\),” on page 16](#).
- To control the switch the SPI Interface is connected to the MPC8568's SPI port 1.

Table 2-3:Ethernet Switch Port Map

BCM5389 Port	Port Media Type	Interconnected Device	Connected PHY Address
0	1000 Base-X	AMC Backplane Port 0	None
1	1000 Base-X	AMC Backplane Port 1	None
2	1000 Base-X	CPU eTSEC1	PHY port 0, MII ADDR 4
3	1000 Base-X	CPU eTSEC2	PHY port 1, MII ADDR 5
4	1000 Base-X	iTDM FPGA RGMII Port	PHY port 2, MII ADDR 6
5	1000 Base-X	Daughtercard Port	DC PHY ADDR 16
6	1000 Base-X	No Connect	None
7	1000 Base-X	No Connect	None
Management	SPI	MPC8568(E) SPI port 1	NA

I-TDM GbE Link (AMC318 Only)

The third externally accessible Gigabit Ethernet interface on the AMC318 is tied to AMC ports 0 or 1 through the BCM5389. This GbE link is connected to the FPGA via a RGMII interface to be used for I-TDM protocol (TDM packetization). See [“I-TDM \(AMC318 Only\),” on page 25](#) for more information.

See [“Ethernet Interfaces,” on page 85](#) for links to additional information and related documents for the Broadcom BCM5389.

Memory

AMC308 memory is comprised of the following components:

- [Flash Memory](#)
- [DDR2 SDRAM Memory](#)

Flash Memory

The AMC308 includes 256 MB of flash memory. This memory is implemented as two 128 MB 8 Spansion S29GL01 bit devices. The device at the highest address contains the boot code and space allocated for the operating system. Leftover space in this device and the entire second device can be used for application code.

DDR2 SDRAM Memory

The AMC308 includes 512 MB of DDR2 SDRAM memory with ECC. The DDR2 SDRAM memory is used to store the PowerPC operational code, program variables, buffer descriptors, and transmitted data. This memory is exclusively controlled by the MPC8568 internal memory controller.

The memory array is implemented as individual memory chips mounted directly on the board. Although the standard memory size is fixed at 512 MB, footprint compatible memory chips can be utilized during the board build to increase the memory space to 1 GB.

OCTALFALC T1/E1/J1 Framer

The Infineon Technologies Octal FALC PEF22558 provides eight independent T1/E1/J1 interfaces on the AMC308. Each interface includes a framer and a line interface unit (LIU) with data and clock recovery, a frame aligner with two frame elastic buffers for receive clock wander and jitter compensation, a signaling controller, and an 8-bit microprocessor interface. Each framer can be independently configured for T1, E1, or J1. See [“OCTALFALC T1/E1/J1 Framer,” on page 86](#) for links to additional information and related documents for this device.

I-TDM (AMC318 Only)

MicroTCA does not support a backplane TDM bus. Instead, PICMG created the Internal TDM Protocol (I-TDM), which is a multiplexed voice over packet (VoP) protocol that is optimized for voice LANs and packet backplanes. AMC318 supports transmission of TDM traffic over I-TDM, providing the ability to transmit TDM traffic to other modules via the I-TDM interface over Ethernet. This ethernet link is on AMC port 0 or 1. The AMC308 and AMC328 do not support I-TDM.

Features

- Two streams of 8 Mbit/sec TDM input data for a total of 256 DS0 time slots connected to TDM TSI switch
- Two streams of 8 Mbit/sec TDM output data for a total of 256 DS0 time slots connected to TDM TSI switch
- One Gigabit Ethernet stream connected to Broadcom Ethernet switch
- 32 bit CPU local bus interface for provisioning and control, with ring-based DMA for 1 ms HMP
- Supports 125 μ s and 1 ms I-TDM modes
- CAS mode can be supported over the CPU local bus interface based on customer requirements
- Flexible TX direction micro sequencer and RX direction packet parser architecture for assembling / disassembling TSI timeslot data into / from I-TDM packets

AMC318 FPGA

The AMC318 incorporates an FPGA, the purpose of which is to include an adaptation function (SFP.1 I-TDM or proprietary Flow-Layer Internal Protocol) that encapsulate TDM digital signaling level zero (DS0s) into Ethernet packets and/or a TDM-switch function.

I-TDM on the AMC318 is implemented using the Accolade Scalable I-TDM Macrocell (ASTDM) core from Accolade Technology, an I-TDM implementation based on the PICMG SFP.1 Specification.

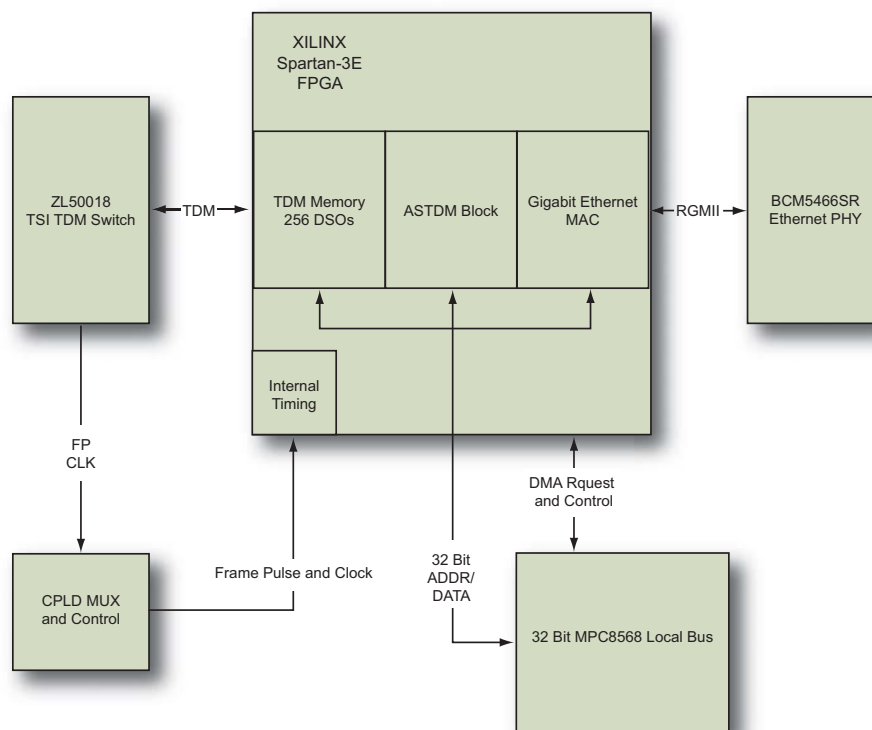
The FPGA implementation also includes an IP core that integrates a gigabit ethernet MAC into the FPGA. The MAC is used to transform the Accolade generic packet bus I/O data to an Ethernet-compatible protocol that can be sent off the board through the on-board Ethernet switch.

Note: The AMC308 and AMC328 are not equipped with an FPGA and are not equipped to handle I-TDM.

See [“I-TDM \(AMC318 Only\),” on page 85](#) for links to additional information and related documents.

Figure 2-4 shows a block diagram of the fully featured FPGA.

Figure 2-4: TDM-to-Ethernet FPGA



TDM to Ethernet Encapsulation Function

On the AMC318, the custom ASTDM IP block handles all the normal data path processing, encapsulating and decapsulating channelized TDM data from 8 Mb/s links over Ethernet packets.

The ASTDM core exchanges TDM data with the TDM switch via two 8 Mb/s input data streams and two 8 Mb/s output data streams. It is configurable by the processor over the CPU local bus. It directly controls the Gigabit MAC block and autonomously handles the “data path” Ethernet frames containing the encapsulated TDMs.

There is other traffic than the encapsulated TDMs on the Ethernet port. In particular there is some “control path” traffic to reconfigure and control the TDM encapsulation. All this non-data-path traffic is redirected to the processor using the processor DMAs. DMA channel 0 is used to receive data from the Ethernet port. The ASTDM core includes buffers for at least one non-data-path Ethernet frame in each direction.

The ASTDM core is based on a microsequencer architecture. It includes a packet classifier and parser to convert packets to/from TDM slots. Slip and jitter buffers are added on the TDM side to adapt the different speeds and absorb delays and jitters on TDM and packet sides. These buffers are implemented internal to the FPGA. The ASTDM core also controls an interrupt to the processor to indicate various events.

The ASTDM core implementation for the AMC318 is configured to support up to 256 DS0s per direction.

AMC Interface

The AMC308 is compliant with the *Advanced Mezzanine Card (AMC) Base Specification, PICMG® AMC.0 R2.0, AMC.1 (PCI Express) and AMC.2 (Ethernet)*. It is designed to be hot-swappable into a mid-size bay on an AdvancedMC or MicroTCA carrier such as PT's AMP5071 1U MicroTCA platform.

Depending on the application, the AMC308 can be inserted in an AMC slot featuring:

- One PCI Express x4 link on AMC ports 4-7 (AMC.1 Type 4)
- Two Gigabit Ethernet links on AMC ports 0 and 1
- Telecom clocks on TCLKA and TCLKB, and TCLKC
- PCI Express 100 MHz clock input on AMC FCLKA (AMC ports 4-7)

Note: Every interface on the AMC connector is optional for the AMC308. The only exception is that if PCI Express is to be used, the AMC FCLKA clock must be driven by the carrier with a 100 MHz reference clock, as required by AMC.1.

For connector location and pinouts see [“AdvancedMC Card Edge Connector P3,” on page 65](#). [“PICMG Specifications,” on page 86](#) contains links to the PICMG Web site, where the AMC specifications may be obtained.

Module Management Controller

The AMC308 includes a Module Management Controller (MMC) based on the Atmel® ATMEGA128L-8MU, which interfaces to the local Intelligent Platform Management bus (IPMBL).

The MMC monitors and controls the module's payload per the PICMG AMC.0 specification. See [Chapter 4, “System Monitoring and Alarms,” on page 37](#) for more information on MMC functionality, supported commands, AMC308 sensors, and the firmware upgrade process.

The AMC308 is compliant with standard Intelligent Platform Management Interface v1.5 Specification functionality. See [“PICMG Specifications,” on page 86](#) for information about this specification.

Sensors

The following sensors are monitored on the AMC308:

- MMC voltage monitoring (3.3 V management power and 12 V power to the AMC slot)
- Air intake temperature sensor
- Temperature sensor on the CPU, which measures the module's high temperatures. The sensor is located between the CPU and the voltage regulator.
- MMC hot-swap switch sensor

Other on-board voltages are also measured. For more information on AMC308 sensors, see [“Sensors,” on page 43](#).

LED Indicators

The AMC308 provides several LED indicators located on the front panel (see [Figure 2-2, “AMC308 Front Panel,” on page 19](#)). [Table 2-4, “AMC308 LED Architecture,”](#) describes the LEDs found on the AMC308.

Table 2-4:AMC308 LED Architecture

LED Name	Description	Color(s)	Function
Telecom Connector Ports 1-8	T1/E1/J1 LEDs. One bicolor LED per port. Function is dependent on loaded software.	Off	Port not enabled
		Green	Port in service
		Red	Port Fault
OOS	Out-of-service LED. Driven by the MMC.	Red	Out-of-service (geographic option 1)
		Amber	Out-of-service (geographic option 2)
IS	In-service LED. Driven by the MMC. Amber when payload is not powered on, then should be set to green by the shelf manager.	Amber	Payload is not powered on
		Green	Payload is in service
CPU	CPU LED. User-programmable. Driven by the MPC8568.	Off	LED circuit failure
		Amber	Power OK, CPU can boot
		Green	CPU In-Service
		Red	CPU Fault
Hot-Swap	Hot-swap LED. Driven by the MMC. See “Hot-Swap LED,” on page 29 for more information about this LED.	Blue	Indicates the module's state as it deactivates in preparation for extraction or reactivate after insertion

Hot-Swap LED

The blue hot-swap LED indicates the module's state as it deactivates in preparation for extraction or reactivate after insertion. Refer also to the *PICMG Advanced Mezzanine Card AMC.0 Specification R2.0* for more information (see “[PICMG Specifications](#),” on page 86).

Insertion Sequence

Off	Module handle open. Management power is not enabled.
Blue on	Module is fully seated in carrier. Module's management power is enabled. User may initiate activation by pushing in the handle on the module's front panel to close the hot-swap switch.
Blue long blink	Module handle is closed. Module is being activated.
Off	Module handle is closed. Module is in normal operational state.

Extraction Sequence

Off	Module is in normal operational state. User may initiate deactivation by pulling out the module handle to open the hot-swap switch, sending a request via the MMC to the carrier for a hot-swap extraction.
Blue short blink	Module handle open. Module is waiting to be deactivated. Not safe to extract module.
Blue on	Module is quiesced. Module payload power is disabled. Safe to extract module.

Software

NexusWare Software Support

NexusWare® is a family of Linux® software products that enable users of PT's broad range of COTS embedded hardware solutions to rapidly develop and deploy value-added capabilities with their solutions. This powerful combination of software and hardware enables system engineers, architects, and designers in telecommunications as well as aerospace and defense markets to create applications and bring to market solutions such as WiMAX, media gateways, managed WAN gateways, VoIP, lawful intercept, radar servers, signaling gateways, and base station controllers.

NexusWare Core

At the very center of the NexusWare Software Suite is NexusWare Core. NexusWare Core is a complete Carrier Grade Linux (CGL) distribution. In addition to being a Linux distribution, NexusWare Core also provides a complete development environment. See <http://pt.com/page/embedded/software/nexusware/nexusware-core/#tools> for the Nexusware Core manual and more information.

NexusWare WAN

NexusWare WAN protocols provides a wide range of WAN protocols, which allows OEMs and system integrators to create flexible and efficient radar gateways, converged serial gateways, and front-end I/O systems. NexusWare WAN software products are offered both as installable software packages for NexusWare Core and as turn-key packages for those developers interested in the protocol package by itself. Whether the installable or the turn-key solution is chosen, developers are provided with a well-documented and powerful API to assist the development process. See <http://pt.com/page/embedded/software/nexusware/nexusware-wan> for the Nexusware WAN manual and more information.

NexusWare SIP

NexusWare SIP is an installable Session Initiation Protocol (SIP) stack and API software package that provides a powerful foundation for application developers for building SIP proxy servers, SIP location servers, SIP registrar servers, and SIP media gateways for wireless and IP telephony systems. See <http://pt.com/page/embedded/software/nexusware/nexusware-sip> for more information.

NexusWare C7

NexusWare C7 is a comprehensive SS7 MTP-2 installable software package that provides a powerful foundation for building SS7 applications for wireless and IP telephony systems. NexusWare C7 provides extensive system scalability. The distributed processing architecture of NexusWare C7 allows the addition of SS7 links into existing equipment without compromising overall host system performance. See <http://pt.com/page/embedded/software/nexusware/nexusware-c7> for the Nexusware C7 manual and more information.

Overview

This chapter provides information about installing and configuring the AMC308. Key topics in this chapter include:

- “Unpacking,” on page 31
- “System Requirements,” on page 32
- “Physical Installation,” on page 33
- “Connecting to the T1/E1/J1 Lines,” on page 34

Unpacking

Before unpacking the module, visually inspect the packing container for any damage that might have occurred during shipment from the factory. If the container appears damaged, immediately contact the company responsible for the shipping and report the damage before opening and unpacking the container. It is recommended that you also notify PT (see “Customer Support and Services,” on page 12 for assistance information).



Caution:

The module is packed in an antistatic bag to protect it during shipment. Keep the module in its protective antistatic bag until you are ready to install it. To prevent damage to the module due to electrostatic discharge, wear a grounding strap and handle the module only by its edges. To reduce the risk of damage to the AMC308, the module must be protected from electrostatic discharge and physical shock. Never remove any of the socketed parts except in a static-free environment. Use the anti-static bag shipped with the product to handle the module.



Caution:

Do not touch the module's components or any metal parts other than the faceplate. Avoid touching areas of integrated circuitry. Static discharge can damage these circuits.

System Requirements

The following topics provide information about system requirements:

- [Compatibility](#)
- [Electrical and Environmental Requirements](#)

Compatibility

The AMC308 is offered with a mid-size front panel. See [Figure 2-2, “AMC308 Front Panel,” on page 19](#) for example of a mid-size front panel. The AMC308 is an AMC.1 module because PCI Express x1 is supported on AMC port 4. It is also an AMC.2 Type E1 and E2 module because it supports Gigabit Ethernet on AMC port 0 and 1. Also I-TDM Gigabit Ethernet is supported on AMC port 0 or 1 (AMC318 only).

The AMC308 is compliant with the *PICMG Advanced Mezzanine Card AMC.0 Specification R2.0*. It is designed to be hot-swappable into a mid-size bay in an AdvancedTCA or MicroTCA platform.

Electrical and Environmental Requirements

Electrical specifications are presented in detail in [“Electrical and Thermal Specifications,” on page 78](#).

The AMC308 is supplied with a heat sink that allows the processor to operate between 0 and 55 °C (32 and 131 °F) ambient with a minimum of 300 LFM (1.27 meters per second) of external airflow. It is the user’s responsibility to ensure that the AMC308 is installed in a chassis capable of supplying adequate airflow. The maximum power consumption is 27.8 W. External airflow must be provided at all times. See [Chapter 6, “Specifications,” on page 77](#) for more details.



Warning:

Operating the AMC308 without adequate airflow will damage the processor.

The AMC308 may contain environmentally hazardous materials that require regulation upon disposal. You must make sure that you dispose of any such materials in accordance with your local rules and regulations. For disposal and recycling information, contact your local authorities or the Electronic Industries Alliance (EIA) at <http://www.eiae.org/>.

PT’s [Compliance with RoHS and WEEE Directives](#) statement is on [page 84](#).

Physical Installation

The AMC308 module is intended to be plugged into a system providing hot-swap control, ramping-up the +12 V power supply only when the AMC module is fully seated into the slot.

If the AMC308 is inserted into a system that does not provide this hot-swap feature for its AMC slot, the carrier power must be shut down before inserting or extracting the module and turned on after the AMC module is fully seated or removed.

If the AMC308 is inserted into a system that supports hot-swap on its AMC slot, it can be inserted or extracted while the platform's power is on.

Installing the AMC308

The following instructions assume that chassis power is on and that the system supports hot-swap insertion. If the system does not support hot swap, power must be turned off prior to installation.

With a grounding strap connected to your wrist or ankle, perform the following steps to install the module:

1. Unlock the ejector handle by gently pulling it away from the front panel.
2. Select an empty AMC slot on the carrier and slide the AMC308 into the available slot, aligning the module with the guides near the top of the slot. The module audibly snaps into place when properly inserted.
3. Press the handle toward the front panel to lock the module in the carrier. When the module card edge connector makes proper contact with the backplane connector, the blue hot-swap LED turns ON and the hardware connection process begins. When the module is operational, the blue hot-swap LED turns OFF.
4. Connect any cables from peripheral devices.

Removing the AMC308

Note: See *"Connecting to the T1/E1/J1 Lines," on page 34* before extracting the module if your equipment is connected to the network.

With a grounding strap connected to your wrist or ankle, perform the following steps to remove the module:

1. Gently press your thumb against the front panel of the module, while pulling the handle away from the front panel to unlock the module. The blue hot-swap LED blinks to indicate that the handle is open and the module is waiting to be deactivated. It is not yet safe to extract the module in this state. Wait until the blue hot-swap LED stops blinking and remains illuminated to indicate that the module is ready for extraction.
2. When the blue hot-swap LED stops blinking and remains illuminated, the module is quiesced and module payload power is disabled. It is now safe to extract the module. Gently pull on the handle to remove the module from the system.
3. Carefully slide the module straight out of the carrier.

Note: An extraction tool such as that manufactured by XTECH can aid in module removal.

Connecting to the T1/E1/J1 Lines

Each of the four port connectors on the [AMC308 Front Panel](#) accesses two T1/E1/J1 channels, for a total of eight lines. A splitter cable is available to bring the lines out separately or a custom connection can be created. See [Figure 5-4, “T1/E1/J1 Splitter Cable,” on page 71](#) and [“T1/E1/J1 Interfaces J2-J5,” on page 70](#).



Warning:

Before connecting the AMC308 to the lines, the continuity of the Protective Earth (PE) should be checked between the host and the shielded connectors of this module (if provided), to verify the earth connection.

The method for connecting your system to the lines depends on whether they are T1/J1 PRI lines or E1 PRI lines. Generally, carriers in North America and Japan provide a T1/J1 PRI line, and carriers in Europe and Australia provide an E1 PRI line. This section provides the following information required to connect your module to the line:

- Connection methods and requirements for connecting to a T1/J1 PRI line
- Connection methods and requirements for connecting to an E1 PRI line
- Summary of steps to connect the system to the network

If your line is a T1/J1, continue to the next section, [“Connecting to T1/J1 PRI Lines,” on page 34](#).

If your line is an E1, skip to [“Connecting to E1 PRI Lines,” on page 35](#).

Connecting to T1/J1 PRI Lines

When you connect the AMC308 to a T1/J1 PRI line, first determine the appropriate connection method, cabling requirements, and link requirements outlined below.

Connection Method

If the line distance is less than 655 feet or 200 meters, and the lines do not go outdoors, you can connect the module in a DSX1 (short haul) configuration directly to the T1/J1 PRI line.

If the total distance of the line to the other end is more than 655 feet or 200 meters (up to 6,200 feet or 1.8 kilometers), or if the lines go outdoors, you must use an external channel service unit (CSU) placed near the AMC308 that translates the short haul DSX1 interface into the longer distance DS1 (long haul) interface.



Warning:

Direct connection to lines that go outdoors are subject to constraints imposed by safety considerations. The AMC308 T1 ports do not support direct connection to outdoor lines because its shielded connectors do not provide enough galvanic isolation between the lines and the shield. The AMC308 can't be directly connected to the T1 PRI line in a DS1 configuration.

T1/J1 PRI Cabling Requirements

The cable must meet the following standard T1 attenuation and transmission requirements:

- 100 Ohm for T1, 110 Ohm for J1
- Two twisted pairs, Category 3 or higher
- Maximum length: 655 feet (200 m) without a CSU, or 6,200 feet (1,800 m) with a CSU
- 26 AWG or larger wire must be used

The equipment and CSU must be configured with several common parameters to interoperate, such as line encoding, frame format, and impedance.

Connecting to E1 PRI Lines

When you connect the module to an E1 PRI line, first determine the appropriate connection method, cabling requirements, and link requirements.

Generally, use a Network Termination 1 (NT1) device to interface between the system and the metallic interface of the network.

A 120 Ohm twisted pairs cable is used for E1.

120 Ohm E1 PRI Cabling Requirements

The cable between the module and the NT1 must meet the following standard E1 attenuation and transmission requirements:

- 120 Ohm
- Two symmetrical twisted pairs, Category 3 or higher
- Maximum length: determined in order to have less than 6 dB attenuation at 1024 kHz (G.703). This generally amounts to 655 to 1000 feet (200 to 350 m).

The cable must include an RJ48C connector. It must also provide the appropriate connector or cabling system at the end dedicated to the NT1.

E1 Link Requirements

If the system connects to an E1 line, the AMC308 and NT1 must be configured with several common parameters to interoperate. The AMC308's E1 parameters are in accordance with the IUT-T I 431 recommendation, as follows:

- Line coding: HDB3, according to IUT-T G.703
- Frame format: according to IUT-T G.704
- CRC4 to Non-CRC4 operation: according to IUT-T G.706 An.B
- Line I/O impedance: 120 Ohm $\pm$ 5%

T1/E1/J1 Connectors

See [“Front Panel Connectors,” on page 68](#) for interface information on the AMC308's front panel connectors.

Overview

The AMC308 performs system monitoring and alarming functions using the flexible, industry standard, Intelligent Platform Management Interface (IPMI). The AMC308 comes equipped with an on-board Module Management Controller (MMC) chip, IPMI, and MMC firmware already installed on the board. The MMC firmware is based on Pigeon Point System's (PPS) MMC firmware. Some of the functions available on this board through the IPMI interface include:

- Monitoring of the CPU and board temperatures with critical and non-critical alerting
- Monitoring of the voltage rails with critical and non-critical alerting
- Remote reset and shutdown of the board
- Monitoring of ejector switches for hot-swap functionality: PT's NexusWare IPMI driver and firmware provide features for hot swap
- Monitoring and event reporting of critical errors
- Interface to IPMB line (IPMB-L)

In order to take advantage of the features provided by the firmware, IPMI-aware applications must be developed. Information on IPMI v1.5 is provided at:

<http://www.intel.com/design/servers/ipmi/spec.htm>

Key topics in this chapter include:

- "MMC Functions," on page 37
- "Summary of Supported Commands," on page 40
- "Device Locator Record," on page 42
- "Sensors," on page 43
- "Serial Interface Subsystem," on page 44
- "Firmware Upgrade Process," on page 53

MMC Functions

The MMC performs system monitoring and alarming functions using the flexible, industry standard, Intelligent Platform Management Interface (IPMI). The module comes equipped with an on-board MMC and IPMI v1.5 firmware already installed on the module. The MMC firmware is based on Pigeon Point System[®]'s (PPS) MMC firmware. Some of the functions available on the module through the IPMI interface include:

- Monitoring of the CPU and board temperatures with critical and non-critical alerting
- Monitoring of the voltage rails with critical and non-critical alerting
- Remote reset and shutdown of the module (hard and soft)

- Monitoring of ejector switches for hot-swap functionality (Performance Technologies' NexusWare IPMI driver and firmware provide additional payload features for hot swap)
- Monitoring and event reporting of critical errors
- Fabric and clock e-keying
- Interface to local IPMB (IPMB-L)

In order to take advantage of the features provided by the firmware, IPMI-aware applications must be developed. Information on IPMI v1.5 is provided at:

<http://www.intel.com/design/servers/ipmi/spec.htm>

Special Payload Requirements for TCLK Management

Unlike FCLKA, the MMC does not have direct control over the Telco clocks (TCLKA-TCLKD). For the MMC to be able to properly respond to the PICMG **Set Clock State** disable command, the MMC needs to know that the clock is physically disabled. Therefore, the MMC and the payload must be synchronized with respect to the physical states of the TCLKs. This is accomplished via the **Get Status PPS** extension command and the **Set Payload TCLK Status** PT OEM command. The synchronization process is as follows.

MMC Behavior

Upon receiving a PICMG **Set Clock State** (enable) command for a TCLK, the MMC will:

1. Write a 1 to the appropriate TCLK Ekey Status indicator.
2. Alert the payload with a BELL character.
3. Respond with a successful completion code.

Upon receiving a PICMG **Set Clock State** (disable) command for a TCLK, the MMC will do the following:

- If the TCLK Physical Status indicates disabled, then the MMC will:
 1. Write a 0 to the appropriate TCLK Ekey Status indicator.
 2. Alert the payload with a BELL character.
 3. Respond with a successful completion code.
- If the TCLK Physical Status indicates enabled, then the MMC will:
 1. Write a 0 to the appropriate TCLK Ekey Status indicator.
 2. Alert the payload with a BELL character.
 3. Respond with a busy completion code.

Upon receiving a PICMG **Get Clock State** command for a TCLK, the MMC will respond with the TCLK Ekey Status - not with the TCLK Physical Status. This means that if a TCLK is logically enabled, but the payload never physically enables it, TCLK will still be reported as enabled.

Payload Behavior

If the payload intends to physically enable a TCLK, then the payload must do the following in the order shown:

1. Determine that the TCLK is logically enabled via ekeying by issuing the **Get Status** command.
2. Issue the **Set Payload TCLK Status** command to indicate that the TCLK is physically enabled (*before* actually enabling it).
3. Determine that the TCLK is still logically enabled via ekeying by issuing the **Get Status** command. If it's not *still* enabled, issue the **Set Payload TCLK Status** command to indicate that the TCLK is physically disabled, and *do not* configure/enable the TCLK.
4. Configure/enable the TCLK. Note that proper configuration of the TCLK will require the payload to determine how the TCLK was ekeyed (family, frequency, accuracy, and direction). This information is obtained by sending a P1CMG **Get Clock State** command to the MMC.

If the payload intends to physically disable an enabled TCLK, the payload must do the following in the order shown:

1. Disable the TCLK.
2. Issue the **Set Payload TCLK Status** command to indicate that the TCLK is physically disabled (*after* actually disabling it).

PT OEM Set Payload TCLK Status Command

The payload issues this command to the MMC to indicate the physical status of the TCLKs.

NetFn Code: 30h

Command Code: 15h

Data: <tclk status>

The format of the <tclk status> parameter is shown in [Table 4-1](#).

Table 4-1: Set Payload TCLK Status Parameter Values

Bit	Description
0	TCLKA Physical Status (0 = disabled, 1 = enabled)
1	TCLKB Physical Status (0 = disabled, 1 = enabled)
2	TCLKC Physical Status (0 = disabled, 1 = enabled)
3	TCLKD Physical Status (0 = disabled, 1 = enabled)

Note that this command provides status for all TCLKs, not just a single TCLK whose status is changing. The provided data must accurately reflect the status of all TCLKs.

Summary of Supported Commands

Table 4-2, “IPMI/PICMG Command Subset Supported by the MMC Firmware,” lists all the commands supported by the MMC.

The **Spec Ref** column indicates where in the relevant specification a command is defined. IPMI references are to v1.5 unless indicated otherwise. The **MMC Req** column indicates if a particular command is required by the relevant specification (*AMC Specification* or *HPM.1 Specification*) or is optional. See the various notes under the table for more information.

Table 4-2: IPMI/PICMG Command Subset Supported by the MMC Firmware

Command	Spec Ref	NetFn	CMD	MMC Req
IPM Device “Global” Commands				
Get Device ID	17.1	App	01h	Mandatory
Cold Reset	17.2	App	02h	Optional
Warm Reset	17.3	App	03h	Optional
Broadcast “Get Device ID” ¹	17.9	App	01h	Mandatory
Messaging Commands				
Set BMC Global Enables	18.1	App	2Eh	Mandatory
Get BMC Global Enables	18.2	App	2Fh	Mandatory
Clear Message Flags	18.3	App	30h	Mandatory
Get Message Flags	18.4	App	31h	Mandatory
Get Message	18.6	App	33h	Mandatory
Send Message	18.7	App	34h	Mandatory
BMC Watchdog Timer				
Reset Watchdog Timer	21.5	App	22h	Mandatory
Set Watchdog Timer	21.6	App	24h	Mandatory
Get Watchdog Timer	21.7	App	25h	Mandatory
Event Commands				
Set Event Receiver	23.1	S/E	00h	Mandatory
Get Event Receiver	23.2	S/E	01h	Mandatory
Platform Event (a.k.a. “Event Message”)	23.3	S/E	02h	Mandatory
Sensor Device Commands				
Get Device SDR Info	29.2	S/E	20h	Mandatory
Get Device SDR	29.3	S/E	21h	Mandatory
Reserve Device SDR Repository	29.4	S/E	22h	Mandatory
Get Sensor Reading Factors	29.5	S/E	23h	Optional
Set Sensor Hysteresis	29.6	S/E	24h	Optional
Get Sensor Hysteresis	29.7	S/E	25h	Optional
Set Sensor Threshold	29.8	S/E	26h	Optional
Get Sensor Threshold	29.9	S/E	27h	Optional
Set Sensor Event Enable	29.10	S/E	28h	Optional
Get Sensor Event Enable	29.11	S/E	29h	Optional

Table 4-2: IPMI/PICMG Command Subset Supported by the MMC Firmware (Continued)

Command	Spec Ref	NetFn	CMD	MMC Req
Get Sensor Event Status	29.13	S/E	2Bh	Optional
Get Sensor Reading	29.14	S/E	2Dh	Mandatory
FRU Device Commands				
Get FRU Inventory Area Info	28.1	Storage	10h	Mandatory
Read FRU Data	28.2	Storage	11h	Mandatory
Write FRU Data	28.3	Storage	12h	Mandatory
AdvancedTCA Commands				
Get PICMG Properties	3-10	PICMG	00h	Mandatory
FRU Control	3-25	PICMG	04h	Mandatory
FRU Control Capabilities	3-24	PICMG	1Eh	Mandatory
Get FRU LED Properties	3-27	PICMG	05h	Mandatory
Get LED Color Capabilities	3-28	PICMG	06h	Mandatory
Set FRU LED State	3-29	PICMG	07h	Mandatory
Get FRU LED State	3-30	PICMG	08h	Mandatory
Get Device Locator Record ID ²	3-35	PICMG	0Dh	Mandatory
AMC Commands				
Set AMC Port State	3-26	PICMG	19h	Optional/ Mandatory
Get AMC Port State	3-27	PICMG	1Ah	Optional/ Mandatory
Set Clock State	3-44	PICMG	2Ch	Optional/ Mandatory
Get Clock State	3-45	PICMG	2Dh	Optional/ Mandatory
HPM.1 Upgrade Commands (HPM.1)				
Get Target Upgrade Capabilities	3-3	PICMG	2Eh	Mandatory
Get Component Properties	3-5	PICMG	2Fh	Mandatory
Abort Firmware Upgrade	3-15	PICMG	30h	Optional
Initiate Upgrade Action ³	3-8	PICMG	31h	Optional/ Mandatory
Upload Firmware Block	3-9	PICMG	32h	Mandatory
Finish Firmware Upload	3-10	PICMG	33h	Mandatory
Activate Firmware	3-11	PICMG	35h	Mandatory
Query Self-Test Results ⁴	3-12	PICMG	36h	Optional/ Mandatory
Query Rollback Status ⁵	3-13	PICMG	37h	Optional/ Mandatory
Initiate Manual Rollback ⁶	3-14	PICMG	38h	Optional/ Mandatory

1. See "[Device ID](#)" below, for the device ID data retrieved in response to a **(Broadcast) Get Device ID** command for this module.
2. See "[Device Locator Record](#)" below, for the IPMB management controller device locator record retrieved in response to a **Get Device Locator Record ID** command for this module.
3. The HPM.1 **Initiate Upgrade Action** command is mandatory for an IPM Controller indicating that any of its implemented components supports preparation for Firmware Upgrade or comparison of the current firmware
4. The HPM.1 **Query Self-test Results** command is mandatory for IPM Controllers indicating self-test is supported in the Self-test capabilities field of the "Get target upgrade capabilities" response or the Self-test capabilities field of the Upgrade Image header.
5. The HPM.1 **Query Rollback Status** command is mandatory for IPM Controllers supporting automatic or manual Roll-back.

6. The HPM.1 **Manual Firmware Rollback** command is mandatory for IPM Controllers indicating manual firmware Rollback is supported in the *Manual firmware Rollback* capabilities field of the "Get target upgrade capabilities" response.

Device Locator Record

The MMC firmware supports the *Get Device Locator Record ID* command for FRU device #0 (the only FRU device represented by an MMC). The MMC firmware obtains the ID of the IPMB management controller device locator record by scanning the SDR records embedded into the firmware.

Table 4-3 shows an example of an IPMB management controller device locator record (SDR type 0x12) describing the properties of the MMC:

Table 4-3: IPMB Management Controller Device Locator Record

Parameter	Value
Power State Notification	
ACPI System Power State notification required	NO
ACPI Device Power State notification required	NO
Global Initialization	
Controller logs Initialization Agent errors	NO
Log Initialization Agent errors accessing this controller	NO
Event Generation	Enable event message generation from controller
Device Capabilities	
Chassis Device	NO
Bridge	NO
IPMB Event Generator	YES
IPMB Event Receiver	NO
FRU Inventory Device	YES
SEL Device	NO
SDR Repository Device	NO
Sensor Device	YES
FRU Entity ID	0xC1
Entity Instance	(slot dependent)
OEM-specific	0
Device ID String Type/Length	8-bit ASCII with size of Device ID String (see below)
Device ID String	AMC308/318/328

Device ID

The MMC firmware provides the following device ID data in response to the (Broadcast) *Get Device ID* command:

Table 4-4: MMC Device ID

Parameter	Value
Device ID	0x00
Provides Device SDRs	YES
Device Revision Number	0x00
Device Available	YES
Firmware Revision	Changes with each release
IPMI Version	1.5
Additional Device Support	
Chassis Device	NO
Bridge	NO
IPMB Event Generator	YES
IPMB Event Receiver	NO
FRU Inventory Device	YES
SEL Device	NO
SDR Repository Device	NO
Sensor Device	YES
Manufacturer ID	0x000614
Product ID	0x0009
Auxiliary Firmware Revision Information	0x00000000

Sensors

[Table 4-5](#) lists the sensors that are monitored by the MMC. Note that the sensor IDs are local to the MMC. The MMC's SDRs are inherited by the next level of management (MicroTCA MCMC or AMC carrier IPMC) and sensor IDs are reassigned.

Table 4-5: MMC Sensors

Sen-sor ID	Description	Lower Non-Recoverable Threshold	Lower Critical Threshold	Lower Non-Critical Threshold	Upper Non-Critical Threshold	Upper Critical Threshold	Upper Non-Recoverable Threshold
0	Hot Swap	N/A	N/A	N/A	N/A	N/A	N/A
1	3.3V MGMT	3.0V	3.068V	3.135V	3.465V	3.533V	3.6V
2	12V	10.0V	10.4V	10.8V	13.2V	13.6V	14.0V
3	Board Temp	-5°C	0°C	5°C	75°C	95°C	105°C
9	Inlet Temp	-5°C	0°C	5°C	65°C	85°C	95°C
4	Power Good	N/A	N/A	N/A	N/A	N/A	N/A

Table 4-5: MMC Sensors

Sensor ID	Description	Lower Non-Recoverable Threshold	Lower Critical Threshold	Lower Non-Critical Threshold	Upper Non-Critical Threshold	Upper Critical Threshold	Upper Non-Recoverable Threshold
5	3.3V Power Good	N/A	N/A	N/A	N/A	N/A	N/A
6	DC Power Good	N/A	N/A	N/A	N/A	N/A	N/A
7	BMC Watchdog	N/A	N/A	N/A	N/A	N/A	N/A
8	Version Change	N/A	N/A	N/A	N/A	N/A	N/A

Interpreting Sensor Events

The ATCA specification includes the following definitions for the sensor event severity levels:

- IPMI non-critical / PICMG 3.0 minor / telco minor – a warning that things are somewhat out of normal range, but not really a “problem” yet. See [“Non-Critical Events”](#) below.
- IPMI critical / PICMG 3.0 major / telco major – things are still in valid operating range, but are getting close to the edge; unit still operating within vendor-specified tolerances. See [“Critical Events”](#) below.
- IPMI non-recoverable / PICMG 3.0 critical / telco critical – unit no longer operating within vendor-specified tolerances. See [“Non-Recoverable Events”](#) below.

Non-Critical Events

Non-critical events are informative only. They do not indicate that the module is outside of its operating limits. In general, no action is required. However, in certain contexts, system or shelf management software may decide that preventive action should be taken. For example, if several modules in a shelf report upper non-critical temperature events, the shelf manager might decide to increase fan speed.

Critical Events

Critical events indicate that the module is still within its operating limits, but it is close to exceeding one of those limits. Possible action in this case is to closely monitor the alarming sensor and take more aggressive action if it approaches the non-recoverable threshold.

Non-Recoverable Events

Non-recoverable events indicate that the module may no longer be functioning because it is now outside of its operating limits. It is likely that action is required or has already been taken by the local hardware/firmware. For example, a processor may have shut itself down because its maximum die temperature was exceeded, or a shelf manager may decide to deactivate the module because the processor is too hot.

Serial Interface Subsystem

The MMC firmware implements a communication protocol over the payload and/or serial debug interfaces. The communication is in the form of formatted ASCII strings.

The Serial Interface Protocol Lite (SIPL) is based on the IPMI-defined Terminal Mode of the serial/modem interface. The following sections describe the SIPL:

- [“Terminal Mode Messages and Commands,” on page 45](#)
- [“Terminal Mode Line Editing,” on page 46](#)
- [“Supported PPS Extension Commands,” on page 46](#)

Terminal Mode Messages and Commands

Terminal Mode Message Format

Terminal Mode messages have the following format:

```
[<message data>]<newline>
```

The left bracket and the right bracket plus <newline> characters serve as START and STOP delimiters for a message. The MMC does not support multi-line IPMI messages.

Raw IPMI Messages

The SIPL supports raw IPMI messages that are entered as sequences of case-insensitive hex-ASCII pairs, each pair optionally separated from the previous one with a single <space> character. What follows are examples of raw IPMI request messages in Terminal Mode:

```
[18 00 22]<newline>
```

```
[180022]<newline>]
```

The MMC handles raw IPMI messages in the same way as it handles IPMI/PICMG/AMC messages coming from the IPMB-L bus and, with the exception that IPMI/PICMG/AMC replies are routed to the interfaces from which the respective requests have come (i.e. either the serial debug or payload interface of the MMC).

Terminal Mode Text Commands

The SIPL does not support Terminal Mode ASCII text commands defined by the *IPMI Specification (section 13.7.8)*.

Pigeon Point Systems (PPS) Extension Commands

The MMC firmware supports a set of PPS extension commands that are used to control and monitor the carrier Intelligent Platform Management Controller (IPMC) state over the serial debug interface. These commands are used to read the MMC status, implement graceful payload shutdown, etc.

The PPS extension commands are implemented as OEM IPMI commands with network function codes 2Eh/2Fh and message body transferred in the same manner as for raw IPMI messages (see [“Raw IPMI Messages,” on page 45](#)). [Figure 4-1, “PPS Extension Command Request,”](#) shows an example of a PPS extension command request:

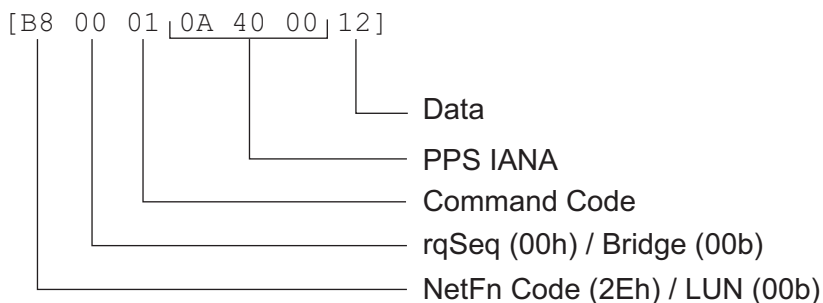
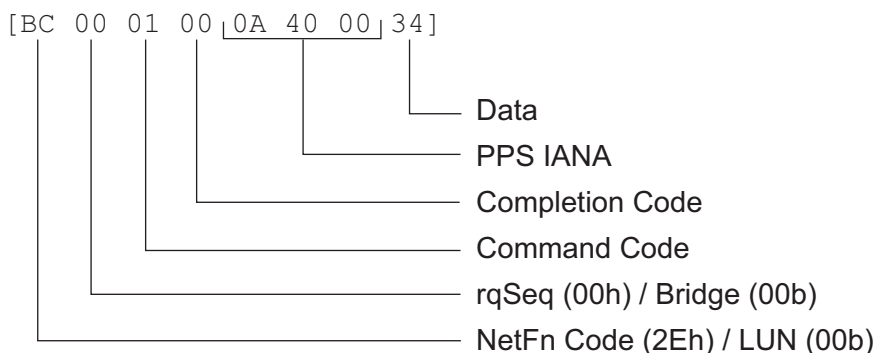
Figure 4-1: PPS Extension Command Request

Figure 4-2, “PPS Extension Command Response,” shows an example of a PPS extension command response:

Figure 4-2: PPS Extension Command Response

Terminal Mode Line Editing

The MMC does not support input line editing functionality defined as optional in the *IPMI Specification (section 13.8)*.

Supported PPS Extension Commands

The MMC firmware supports the following PPS extension commands (see “[Pigeon Point Systems \(PPS\) Extension Commands](#),” on page 45):

Table 4-6: PPS Extension Commands Supported by the MMC

Command Request/Response	Code	Likely Command Source(s)	Description	See Also
Get Status	0x00	Serial debug and payload interfaces	Read the MMC status	Get Status Command
Get Serial Interface Properties	0x01	Serial debug and payload interfaces	Get the properties of a serial interface	Serial Line Properties Commands
Set Serial Interface Properties	0x02	Serial debug and payload interfaces	Set the properties of a serial interface	

Table 4-6: PPS Extension Commands Supported by the MMC (Continued)

Command Request/Response	Code	Likely Command Source(s)	Description	See Also
Get Debug Level	0x03	Serial debug interface	Get debug/verbosity level	Debug/Verbosity Level
Set Debug Level	0x04	Serial debug interface	Set debug/verbosity level	
Get Payload Communication Timeout	0x09	Serial debug and payload interfaces	Get the timeout for payload communications	Payload Communication Timeout
Set Payload Communication Timeout	0x0A	Serial debug and payload interfaces	Set the timeout for payload communications	
Graceful Reset	0x11	Payload interface	The payload is ready to be shut down/reset	Graceful Payload Reset
Diagnostic Interrupt Results	0x12	Payload interface	Return diagnostic interrupt results	Payload Diagnostic Interrupt
Get Payload Shutdown Timeout	0x15	Serial debug and payload interfaces	Get the timeout for payload shutdown	Payload Shutdown Timeout
Set Payload Shutdown Timeout	0x16	Serial debug and payload interfaces	Set the timeout for payload shutdown	
Get Geographic Address	0x2C	Serial debug and payload interfaces	Get the geographic address	Get Geographic Address Command

The MMC accepts all PPS extension commands listed in [Table 4-6](#) from both serial interfaces, as well as IPMB-L. This is done to achieve additional flexibility and extensibility in the MMC functionality.

The PPS extension commands listed in [Table 4-6](#) are referred to as the SIPL commands throughout this document. The following sections discuss the SIPL commands in more detail.

Get Status Command

The IPMC status is four bytes describing the logical state of the IPMC and the payload. [Table 4-7, “IPMC Status Bits,”](#) provides a description of the IPMC status bits:

Table 4-7: IPMC Status Bits

Bit	Name	Description
Byte 1		
0 (LSB)	Control	If set to 0, the IPMC control over the payload is disabled.
1-2	NA	Reserved
3	Sensor Alert	If set to 1, indicates that at least one of the IPMC sensors detects threshold crossing.
4	Reset Alert	If set to 1, indicates that the payload is going to be reset.
5	Shutdown Alert	If set to 1, indicates that the payload is going to be shut down.
6	Diagnostic Interrupt Request	If set to 1, indicates that a payload diagnostic interrupt request has arrived.
7 (MSB)	Graceful Reboot Request	If set to 1, indicates that the payload is requested to initiate the graceful reboot sequence.

Table 4-7: IPMC Status Bits (Continued)

Bit	Name	Description
Byte 2		
0	TCLKA Ekey Status	If set to 1, TCLKA has been logically enabled by ekeying.
1	TCLKB Ekey Status	If set to 1, TCLKB has been logically enabled by ekeying.
2	TCLKC Ekey Status	If set to 1, TCLKC has been logically enabled by ekeying.
3	TCLKD Ekey Status	If set to 1, TCLKD has been logically enabled by ekeying.
4	TCLKA Physical Status	If set to 1, the payload has indicated that TCLKA has been physically enabled.
5	TCLKB Physical Status	If set to 1, the payload has indicated that TCLKB has been physically enabled.
6	TCLKC Physical Status	If set to 1, the payload has indicated that TCLKC has been physically enabled.
7	TCLKD Physical Status	If set to 1, the payload has indicated that TCLKD has been physically enabled.
Byte 3		
0-7	NA	Reserved
Byte 4		
0-3	NA	Reserved
4	Message Received	If set to 1, indicates that a message for the payload has been received.
5-7	NA	Reserved

The IPMC firmware notifies the payload about changes of all status bits except for bits 0-2 of byte 1 by sending an unprintable character (ASCII 07, BELL) over the payload interface. The payload is expected to use the **Get Status** command to identify pending events and other SIPL commands to provide a response (if necessary). The event notification character is sent in a synchronous manner, and does not appear in the contents of SIPL messages sent to the payload.

The **Get Status** command has the following synopsis:

```
[B8 xx 00 0A 40 00]
```

The IPMC responds to the **Get Status** command with the following reply:

```
[BC xx 00 00 0A 40 00 <byte1> <byte2> <byte3> <byte4>]
```

Serial Line Properties Commands

The SIPL provides commands to get/set the properties of the MMC serial interfaces (the serial debug interface and the payload interface):

- “Get Serial Interface Properties Command,” on page 49
- “Set Serial Interface Properties Command,” on page 49

Get Serial Interface Properties Command

The **Get Serial Interface Properties** command is used to get the properties of a particular serial interface. This command has the following synopsis:

```
[B8 xx 01 0A 40 00 <interface ID>]
```

The <interface ID> parameter can have one of the values shown in [Table 4-8, “The <interface ID> Parameter Values,”](#) below.

Table 4-8: The <interface ID> Parameter Values

Interface ID	Description
0	Serial debug interface
1	Payload interface

The MMC responds to the **Get Serial Interface Properties** command with the following reply:

```
[BC xx 01 00 0A 40 00 <interface properties>]
```

The <interface properties> parameter has the bit fields shown in [Table 4-9, “The <interface properties> Parameter Bit Fields,”](#) below.

Table 4-9: The <interface properties> Parameter Bit Fields

Bits	Name	Description
0-3	Baud Rate ID	The baud rate ID defines the interface baud rate as follows: 0 – 9600 bps 1 – 19200 bps 2 – 38400 bps 3 – 57600 bps 4 – 115200 bps
4-6	NA	Reserved
7 (MSB)	Echo On	If this bit is set, the MMC enables echo for the given serial interface.

Set Serial Interface Properties Command

The **Set Serial Interface Properties** command is used to change the properties of a given interface:

```
[B8 xx 02 0A 40 00 <interface ID> <interface properties>]
```

Debug/Verbosity Level

The SIPL provides commands to enable and disable output of error/diagnostic messages to the serial debug interface at runtime:

- “Get Debug Level Command,” on page 50
- “Set Debug Level Command,” on page 50

Get Debug Level Command

To get the current debug level, the **Get Debug Level** command must be used. This command has the following synopsis:

```
[B8 xx 03 0A 40 00]
```

The MMC responds to the **Get Debug Level** command with the following reply:

```
[BC xx 03 00 0A 40 00 <debug level>]
```

The <debug level> parameter contains the bit fields shown in [Table 4-10, “MMC Debug Levels,”](#) below.

Table 4-10: MMC Debug Levels

Bit	Name	Description
0 (LSB)	Error Logging Enable	If set to 1, the MMC outputs error/diagnostic messages onto the serial debug interface.
1	Low-level Error Logging Enable	If set to 1, the MMC outputs low-level error/diagnostic messages onto the serial debug interface.
2	Alert Logging Enable	If set to 1, the MMC outputs important alert messages onto the serial debug interface.
3	Payload Logging Enable	If set to 1, the MMC provides a trace of SIPL activity on the payload interface onto the serial debug interface.
4	IPMB Dump Enable	If set to 1, the MMC provides a trace of IPMB messages that are arriving to/going from the MMC via IPMB-L.
5-7	NA	Reserved

Set Debug Level Command

To change the current debug level, the **Set Debug Level** command must be used. This command has the following synopsis:

```
[B8 xx 04 0A 40 00 <debug level>]
```

Payload Communication Timeout

Some of the SIPL commands are subject to payload communication timeouts. If the payload does not respond with a correct reply within a definite period of time, the MMC assumes that a payload communication timeout occurred and acts accordingly. The SIPL timeout value also limits the period of time given to the payload to prepare for a payload reset.

- [“Get Payload Communication Timeout Command,” on page 51](#)
- [“Set Payload Communication Timeout Command,” on page 51](#)

Get Payload Communication Timeout Command

The MMC supports reading of the payload communication timeout using the **Get Payload Communication Timeout** command. This command has the following synopsis:

```
[B8 xx 09 0A 40 00]
```

The MMC responds to the **Get Payload Communication Timeout** command with the following reply:

```
[BC xx 09 00 0A 40 00 <payload timeout>]
```

The <payload timeout> parameter is the payload communication timeout measured in hundreds of milliseconds. Thus, the payload communication timeout may vary from 0.1 to 25.5 seconds. The default value of the payload communication timeout is specified by the CFG_APP_SIPL_PAYLOAD_TIMEOUT Configuration Parameter.

Set Payload Communication Timeout Command

To change the payload communication timeout, the **Set Payload Communication Timeout** command is used:

```
[B8 xx 0A 0A 40 00 <payload timeout>]
```

Graceful Payload Reset

The MMC supports the Graceful Reboot option of the **FRU Control** command. On receiving such a command, the MMC sets the Graceful Reboot Request bit of the MMC status, sends a status update notification to the payload, and waits for the **Graceful Reset** command from the payload. If the MMC receives such a command before the payload communication timeout time, it sends the 0x00 completion code (Success) to the carrier controller. Otherwise, the 0xC3 completion code (Timeout) is sent.

The **Graceful Reset** command has the following synopsis:

```
[B8 xx 11 0A 40 00]
```

Note that the MMC does not reset the payload on receiving the **Graceful Reset** command or timeout. If the MMC participation is necessary, the payload must request the MMC to perform a payload reset.

The **Graceful Reset** command is also used to notify the MMC about the completion of the payload shutdown sequence (refer to [“Payload Shutdown Timeout,” on page 52](#)).

Payload Diagnostic Interrupt

The MMC supports the Issue Diagnostic Interrupt feature of the **FRU Control** command. The payload is notified about a diagnostic interrupt over the SIPL as described in [“Get Status Command,” on page 47](#). The payload is expected to return diagnostic interrupt results before the payload communication timeout using the **Diagnostic Interrupt Results** command of the SIPL. This command has the following synopsis:

```
[B8 xx 12 0A 40 00 <diagnostic interrupt return code>]
```

If the payload responds before the payload communication timeout, the diagnostic interrupt return code is forwarded to the carrier controller as the completion code of the **FRU Control** command response. Otherwise, the 0xC3 completion code (Timeout) is returned.

Payload Shutdown Timeout

When the carrier controller commands the MMC to shut down the payload (i.e. sends the FRU Control (Quiesce) command), the MMC notifies the payload about it by asserting appropriate alert and sending an alert notification to the payload (refer to [“Get Status Command,” on page 47](#)). Upon receiving this notification, the payload software is expected to initiate the payload shutdown sequence. After performing this sequence, the payload should send the **Graceful Reset** command (refer to [“Graceful Payload Reset,” on page 51](#)) to the MMC over the payload interface to notify the MMC that the payload shutdown is complete.

To avoid deadlocks that may occur if the payload software does not respond, the MMC provides a special timeout for the payload shutdown sequence. If the payload does not send the Graceful Reset command within a definite period of time, the MMC assumes that the payload shutdown sequence is finished, and sends a Module Quiesced hot-swap event to the carrier controller.

- [“Get Payload Shutdown Timeout Command,” on page 52](#)
- [“Set Payload Shutdown Timeout Command,” on page 52](#)

Get Payload Shutdown Timeout Command

The MMC supports reading of the payload shutdown timeout using the **Get Payload Shutdown Timeout** command. This command has the following synopsis:

```
[B8 xx 15 0A 40 00]
```

The MMC responds to the **Get Payload Shutdown Timeout** command with the following reply:

```
[BC xx 15 00 0A 40 00 <LSB byte of timeout> <MSB byte of timeout>]
```

The payload shutdown timeout is measured in hundreds of milliseconds and stored as a 2-byte integer. The default value of the payload shutdown timeout is specified by a dedicated Configuration Parameter.

Set Payload Shutdown Timeout Command

To change the payload shutdown timeout, the **Set Payload Shutdown Timeout** command is used:

```
[B8 xx 16 0A 40 00 <LSB byte of timeout> <MSB byte of timeout>]
```

Get Geographic Address Command

The MMC allows reading the geographic address of the module using the **Get Geographic Address** command, which has the following synopsis:

```
[B8 xx 2C 0A 40 00]
```

The MMC responds to the **Get IPMB Address** command with the following reply:

```
[BC xx 2C 00 0A 40 00 <geographic address>]
```

The <geographic address> parameter has the bit fields shown in [Table 4-11](#), “The <geographic address> Parameter Bit Fields,” below.

Table 4-11: The <geographic address> Parameter Bit Fields

Bits	Name	Description
0-1	GA0 Signal	0 = GA0 is grounded 1 = GA0 is unconnected 3 = GA0 is pulled up
2-3	GA1 Signal	0 = GA1 is grounded 1 = GA1 is unconnected 3 = GA1 is pulled up
4-5	GA2 Signal	0 = GA2 is grounded 1 = GA2 is unconnected 3 = GA2 is pulled up
6-7	NA	Reserved

Firmware Upgrade Process

The MMC firmware supports a reliable field upgrade procedure compatible with the *HPM.1 Specification*. The key features of the firmware upgrade procedures are as follows:

- The upgrade can be performed over the serial debug/payload interface or over IPMB-L.
- The upgrade procedure is performed while the MMC firmware is online and operating normally.
- Upgrades of the firmware component are reliable. A failure in the download (error or interruption) does not disturb the MMC’s ability to continue using the “old” firmware or its ability to restart the download process. Upgrades of the boot loader component are not reliable and may render the MMC non-functional in case of an incomplete upgrade.
- Upgrades of the firmware component are reversible. The MMC firmware automatically reverts back to the previous firmware if there is a problem when first running the new code and can be reverted manually using the HPM.1-defined **Manual Rollback** command. Upgrades of the boot loader component are not reversible.

HPM.1 Boot Loader

- The HPM.1 boot loader does not perform any upgrade actions
- The HPM.1 boot loader is able to boot either of two redundant copies of the MMC firmware in flash
- The HPM.1 boot loader is able to automatically rollback a failed copy of the MMC firmware and activate the backup one
- The HPM.1 boot loader can be upgraded in-field as an HPM.1-upgradeable component

HPM.1 Firmware Upgrade

The HPM.1 upgrade procedure is managed by a utility called the *upgrade agent*. The `ipmitool` utility is used as upgrade agent for upgrading the MMC firmware.

The upgrade agent communicates with the MMC firmware via serial interface or IPMB-L, and uses the ATCA commands that are described in the *HPM.1 Specification* for upgrading the firmware. Updated firmware is packed into a special image that has a format described in the *HPM.1 Specification*. That image is used by the upgrade agent to prepare and upgrade the MMC firmware. The HPM.1 upgrade procedure includes the following steps:

1. **Preparation step.** This step erases the region in the flash memory where a component will be written.
2. **Component upload step.** This step is designed to upload the component image via IPMB or a serial interface, and write it into the flash memory.
3. **Component activation step.** This step is designed to activate the previously upgraded component; for the firmware component, this step can be deferred until a later time.

The MMC firmware supports two upgradeable components: the firmware itself and the boot loader. In case of an unsuccessful firmware upgrade it is possible to roll back to the old firmware. This is not true for the boot loader.

Note: *Extreme caution should be exercised when upgrading the boot loader. There is no backup copy of the boot loader and if for any reason the boot loader upgrade procedure fails, the firmware becomes non-functional after reboot and must be reprogrammed over JTAG.*

Upgrade Utilities

The firmware upgrade procedure is performed using the upgrade agent utility, implementing the HPM.1 Upgrade Protocol and capable of programming custom firmware images into the flash memory of the MMC over a serial interface or IPMB-L. Any HPM.1-compatible Upgrade Agent can be used to upgrade the MMC firmware. It is recommended to use the `ipmitool` utility for these purposes. The `ipmitool` utility is available from Performance Technologies. Contact Performance Technologies Customer Support and Services for contact information.

The firmware image is supplied to the `ipmitool` utility in a single file called an HPM.1 upgrade image (for information about the format of HPM.1 upgrade images refer to the HPM.1 specification).

Detailed HPM.1 Upgrade Procedure

The following images are available from Performance Technologies:

- `hpm1fw.img` - this image contains the MMC firmware
- `hpm1boot.img` - this image contains the boot loader
- `hpm1all.img` - this image contains both the firmware and the boot loader

These images can be used to upgrade corresponding components of the IPMC: the firmware, the boot loader or both.

The following snapshot samples a command performing firmware upgrade from a Linux host over LAN/IPMB:

```

ipmitool -I lan -H 192.168.0.2 -A none -T 0x82 -B 0 -t 0x7c -b 7 hpm upgrade
hpm1fw.img activate
PICMG HPM.1 Upgrade Agent 1.0:
Validating firmware image integrity...OK
Performing preparation stage...
    Services may be affected during upgrade. Do you wish to continue? y/n y...
OK
    Target Product ID : 15
    Target Manufacturer ID: 1556
Performing upgrade stage:
    Upgrading AVR-AMCm F/W
    with Version:      Major: 1
                      Minor: 70
                      Aux: 000 000 000 000
    Writing firmware: 100 % completed
Performing activation stage:
Firmware upgrade procedure successful

```

IPMI Communication Utility (ipmitool)

The `ipmitool` utility is a Linux application that can be used for a wide range of tasks involving IPMI-based communications. The following topics describe the installation process and provide information on specific applications of this utility.

Note: Contact Performance Technologies Customer Support and Services for an enhanced version of `ipmitool`. Besides the standard functionality, it supports the following vendor-specific enhancements, which are not available in the official release (as of version 1.8.9):

- Support for the serial IPMI interface (Terminal Mode)
- Some improvements in HPM.1 upgrade protocol implementation.
- Support for double bridging via LAN for accessing MMCs through the Shelf Manager and carrier IPMC.

The enhanced version is available in binary form for Windows and in source form for Linux.

Building the ipmitool Utility

Build and install the `ipmitool` utility on a Linux host system using the following procedure:

1. Unpack the source tarball obtained from the secure Web site and change to the `ipmitool` directory:

```

bash$ tar xzf <ipmitool_package_name>
bash$ cd ipmitool

```

2. Run the configure script to prepare for the build. The `--prefix=<dir>` option can be used to specify the directory where the resulting files are installed. If not specified, `/usr/local` is used (in this case, the installation requires root privileges).

```

bash$ ./configure --prefix=/home/user/ipmitool

```

3. Run the **make install** command to build and install the `ipmitool` utility.

```
bash$ make install
```

Accessing an MMC with ipmitool

The available access methods that can be used to communicate with the MMC depend on the MMC firmware configuration and overall system setup. The most frequently used access methods are the following:

- Via an Ethernet connection to a Shelf Manager that is able to access via IPMB-0 the carrier IPMC managing the MMC. See [“Accessing an MMC via a Shelf Manager,” on page 56](#).
This access method can be used from any Linux or Windows host that has an Ethernet connection to the Shelf Manager of the shelf in which the MMC is installed. In this access method, the `ipmitool` utility uses an Ethernet connection to the Shelf Manager to double bridge IPMI requests to the MMC over IPMB-0 and IPMB-L.
- Via the serial debug or serial payload interface of the MMC. See [“Accessing an MMC via a Serial Interface,” on page 57](#).
This access method can be used from any Linux or Windows host that has a serial connection with the MMC’s serial debug or serial payload interfaces. In this access method, the `ipmitool` utility uses a serial interface to directly access the MMC.

Accessing an MMC via a Shelf Manager

To access the MMC using an Ethernet connection to a Shelf Manager, the following parameters should be specified in the command line of the `ipmitool` utility:

`-I lan`

This command line parameter instructs the `ipmitool` utility to use Ethernet for communications with the MMC.

`-H <Shelf Manager IP>`

This command line parameter specifies the IP address of the Shelf Manager.

`-T <carrier IPMC address>`

This command line parameter specifies the remote transit address (IPMB-0 address of the carrier IPMC) to which requests should be bridged by the Shelf Manager.

`-B 0`

This command line parameter specifies the remote transit channel (with 0 designating IPMB-0) to which requests should be bridged by the Shelf Manager.

`-t <MMC address>`

This command line parameter specifies the remote target address (IPMB-L address of the MMC) to which requests should be bridged by the carrier IPMC.

`-b 7`

This command line parameter specifies the remote target channel (with 7 designating IPMB-L) to which requests should be bridged by the carrier IPMC.

`-A <authtype>`

This command line parameter forces the `ipmitool` to use a specific authentication type, which must, of course, be supported by the Shelf Manager.

For example, to fetch and print Sensor Device Records of an MMC at IPMB-L address 0x72 via a Shelf Manager with the IP address 192.168.0.2, and a carrier IPMC at IPMB-0 address 0x82, the following command line should be used:

```
# ipmitool -I lan -H 192.168.0.2 -T 0x82 -B 0 -t 0x72 -b 7 -A none sdr
```

Accessing an MMC via a Serial Interface

The following `ipmitool` command line parameters are used for communicating with the MMC via a serial interface:

`-I serial-terminal`

This command line parameter instructs the `ipmitool` utility to use the serial interface for communications with the MMC.

`-D <dev[:baudrate]>`

This command line parameter specifies the serial device and baud rate settings to use. For Linux hosts, the serial device is the system path to the device node (e.g. `/dev/ttyS0`). For the Cygwin-flavor of the `ipmitool` utility, Windows serial device names are translated as follows: the COM1 device name is mapped to `/dev/ttyS0`, COM2 is mapped to `/dev/ttyS1` and so on.

The supported baud rates are: 2400, 9600, 19200, 38400, 57600, and 115200.

For example, to fetch and print Sensor Device Records of an MMC via a serial interface connection with a baud rate of 9600, the following command line should be used:

```
# ipmitool -I serial-terminal -D /dev/ttyS0:9600 sdr
```

Using ipmitool for HPM.1 Upgrades

The `ipmitool` utility has built-in HPM.1 upgrade functionality and can be used as an upgrade agent. To be able to send HPM.1 commands to the MMC, the proper connection options should be specified in the `ipmitool` command line.

See [“Accessing an MMC with ipmitool,” on page 56](#) for the list of available `ipmitool` command line connection options.

HPM.1 Commands

The `ipmitool` utility supports the following HPM.1 commands, which are described on the following pages:

- [“targetcap,” on page 58](#)
- [“compprop,” on page 59](#)
- [“upgrade,” on page 60](#)
- [“activate,” on page 61](#)
- [“rollback,” on page 61](#)
- [“rollbackstatus,” on page 61](#)

targetcap

Get the target upgrade capabilities. This command can be used to find out the upgrade capabilities of an MMC.

```
ipmitool hpm targetcap
```

Example:

```
ipmitool -I lan -H 192.168.0.2 -A none -T 0x82 -B 0 -t 0x74 -b 7 hpm targetcap
```

```
PICMG HPM.1 Upgrade Agent 1.0:
```

```
TARGET UPGRADE CAPABILITIES
```

```

-----
HPM.1 version.....0
Component 0 presence....[y]
Component 1 presence....[y]
Component 2 presence....[n]
Component 3 presence....[n]
Component 4 presence....[n]
Component 5 presence....[n]
Component 6 presence....[n]
Component 7 presence....[n]
Upgrade undesirable....[n]
Aut rollback override...[n]
IPMC degraded.....[n]
Deferred1 activation.....[y]
Service affected.....[y]
Manual rollback.....[y]
Automatic rollback.....[y]
Self test.....[n]
Upgrade timeout.....[100 sec]
Self test timeout.....[0 sec]
Rollback timeout.....[5 sec]
Inaccessibility timeout.[5 sec]

```

1. "Deferred" is misspelled in the `ipmitool` utility.

compprop

Get the specified component properties. This command can be used to find out component-specific properties.

```
ipmitool hpm compprop <id> <select>
```

The <id> parameter specifies the component whose properties are read; 0 corresponds to the firmware component and 1 corresponds to the boot loader component. The <select> parameter specifies the property that should be acquired. The properties are the following:

- 0 General properties
- 1 Current firmware version
- 2 Description string
- 3 Rollback firmware version
- 4 Deferred firmware version

Example:

```
ipmitool -I lan -H 192.168.0.2 -A none -T 0x82 -B 0 -t 0x74 -b 7 hpm compprop 0 0
```

```
PICMG HPM.1 Upgrade Agent 1.0:
```

```
GENERAL PROPERTIES
```

```
-----
```

```
Payload cold reset req....[y]
```

```
Def. activation supported.[y]
```

```
Comparison supported.....[n]
```

```
Preparation supported.....[y]
```

```
Rollback supported.....[y]
```

upgrade

Upgrade the firmware with the specified image. This command can be used to upgrade the firmware using a valid HPM.1 image.

```
ipmitool hpm upgrade <file> [activate]
```

The <file> parameter specifies the name of the HPM.1 upgrade image. If the [activate] parameter is specified, the upgraded firmware is activated just after the upgrade procedure. In the other case, an additional command should be issued to activate the firmware.

Example:

```
ipmitool -I lan -H 192.168.0.2 -A none -T 0x82 -B 0 -t 0x74 -b 7 hpm upgrade hpm1fw.img
```

```
Validating firmware image integrity...OK
```

```
Performing preparation stage...
```

```
Services may be affected during upgrade. Do you wish to continue? y/n y
OK
```

```
Target Product ID      : 15
```

```
Target Manufacturer ID: 1556
```

```
Performing upgrade stage:
```

```
Upgrading AVR-AMCm F/W
```

```
with Version: Major: 0
```

```
Minor: 5
```

```
Aux   : 000 000 000 000
```

```
Writing firmware: 100 % completed
```

activate

Activate the newly uploaded firmware. This command can be used for activating the newly uploaded firmware if there was no activate parameter passed to the upgrade command.

```
ipmitool hpm activate
```

Example:

```
ipmitool -I lan -H 192.168.0.2 -A none -T 0x82 -B 0 -t 0x74 -b 7 hpm activate
PICMG HPM.1 Upgrade Agent 1.0:
```

rollback

Perform a manual rollback on the IPM controller. This command can be used to roll back from the newly uploaded firmware to the old one.

```
ipmitool hpm rollback
```

Example:

```
ipmitool -I lan -H 192.168.0.2 -A none -T 0x82 -B 0 -t 0x74 -b 7 hpm rollback
PICMG HPM.1 Upgrade Agent 1.0:
```

rollbackstatus

Query the rollback status. This command can be used to query the firmware on the IPMC about whether a rollback event has occurred.

```
ipmitool hpm rollbackstatus
```

Example:

```
ipmitool -I lan -H 192.168.0.2 -A none -T 0x82 -B 0 -t 0x74 -b 7 hpm rollback-
status
PICMG HPM.1 Upgrade Agent 1.0:
Rollback occurred2 on component mask: 0x01
```

2. "occured" is misspelled in the ipmitool utility.

Overview

The AMC308 includes several connectors and jumpers to interface with application-specific devices. [Figure 5-1, “AMC308 Connector Locations \(Bottom and Front\),”](#) and [Figure 5-2, “AMC308 Connector Locations \(Top\),”](#) on page 64 show the locations of these connectors.

A detailed description and pinout for each connector and jumper is given in the topics that follow:

- [“AdvancedMC Card Edge Connector P3,”](#) on page 65
- [“Front Panel Connectors,”](#) on page 68
 - [“RS232 Serial Console Port J1,”](#) on page 68
 - [“T1/E1/J1 Interfaces J2-J5,”](#) on page 70
- [“Internal Connectors,”](#) on page 72
 - [“Debug Port P1-P2,”](#) on page 72
 - [“Mezzanine Connector P4 \(AMC308/AMC328 Only\),”](#) on page 72
- [“Switch and Jumper Configuration,”](#) on page 74

Figure 5-1: AMC308 Connector Locations (Bottom and Front)

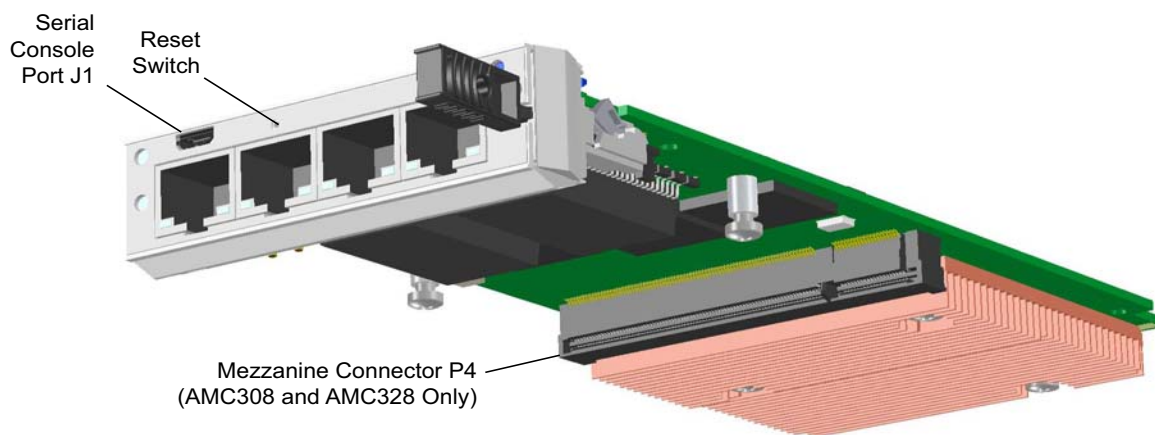
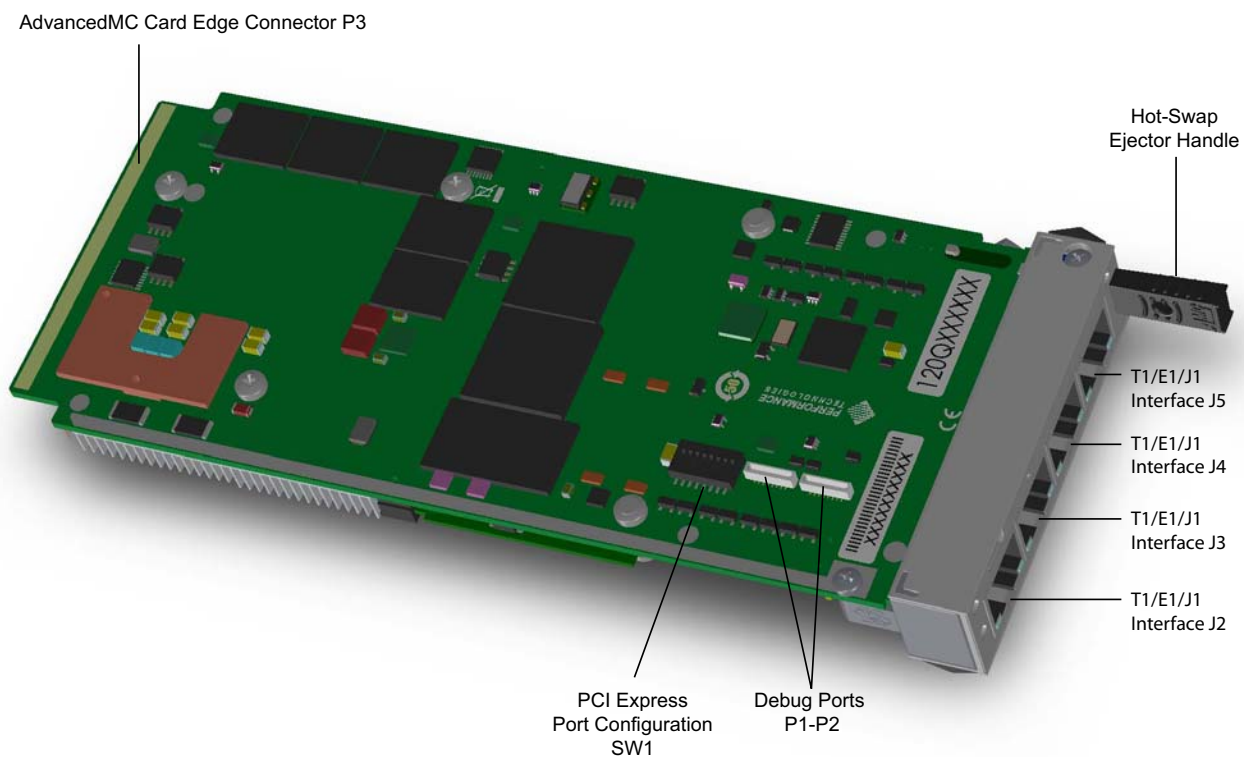


Figure 5-2: AMC308 Connector Locations (Top)



AdvancedMC Card Edge Connector P3

The AMC connector provides the electrical interface between the AMC308 and the MicroTCA platform or ATCA carrier. The AMC connector is fixed to the platform and the card edge interface at the back of the AMC308 plugs into it. There are different styles of connectors for the different types of AMC bays and for different levels of connectivity. The card edge interface on the AMC308 is compatible with the extended, 170 pin B+ style connector, such as that found on PT's AMP5071 MicroTCA platform.

See [Figure 5-2, "AMC308 Connector Locations \(Top\)," on page 64](#) for connector identification. [Table 5-1, "AMC Connector Pinout,"](#) provides the pinout for the AMC308 card edge connector.

Table 5-1: AMC Connector Pinout

Pin No.	Signal	Driven by	Mating	Pin Function on the Module	Used by AMC 308	Pin No.	Signal	Driven by	Mating	Pin Function on the Module	Used by AMC 308
1	GND		First	Logic Ground	Yes	170	GND		First	Logic Ground	Yes
2	PWR	Carrier	First	Payload Power	Yes	169	TDI	Carrier	Second	JTAG Test Data Input	Yes
3	PS1#	Module	Last	Presence 1	Yes	168	TDO	Module	Second	JTAG Test Data Output	Yes
4	MP	Carrier	First	Management Power	Yes	167	TRST#	Carrier	Second	JTAG Test Reset Input	Yes
5	GA0	Carrier	Second	Geographic Addr. 0	Yes	166	TMS	Carrier	Second	JTAG Test Mode Select In	Yes
6	RSRV D6		Second	Reserved, n/a	No	165	TCK	Carrier	Second	JTAG Test Clock Input	Yes
7	GND		First	Logic Ground	Yes	164	GND		First	Logic Ground	Yes
8	RSRV D8		Second	Reserved, n/a	No	163	Tx20+		Third	Port 20 Tx +	No
9	PWR	Carrier	First	Payload Power	Yes	162	Tx20-		Third	Port 20 Tx -	No
10	GND		First	Logic Ground	Yes	161	GND		First	Logic Ground	Yes
11	Tx0+	Module	Third	Port 0 Tx +	Yes	160	Rx20+		Third	Port 20 Rx +	No
12	Tx0-	Module	Third	Port 0 Tx -	Yes	159	Rx20-		Third	Port 20 Rx -	No
13	GND		First	Logic Ground	Yes	158	GND		First	Logic Ground	Yes
14	Rx0+	Carrier	Third	Port 0 Rx +	Yes	157	Tx19+		Third	Port 19 Tx +	No
15	Rx0-	Carrier	Third	Port 0 Rx -	Yes	156	Tx19-		Third	Port 19 Tx -	No
16	GND		First	Logic Ground	Yes	155	GND		First	Logic Ground	Yes
17	GA1	Carrier	Second	Geographic Addr. 1	Yes	154	Rx19+		Third	Port 19 Rx +	No
18	PWR	Carrier	First	Payload Power	Yes	153	Rx19-		Third	Port 19 Rx -	No
19	GND		First	Logic Ground	Yes	152	GND		First	Logic Ground	Yes
20	Tx1+	Module	Third	Port 1 Tx +	Yes	151	Tx18+		Third	Port 18 Tx +	No
21	Tx1-	Module	Third	Port 1 Tx-	Yes	150	Tx18-		Third	Port 18 Tx -	No
22	GND		First	Logic Ground	Yes	149	GND		First	Logic Ground	Yes
23	Rx1+	Carrier	Third	Port 1 Rx +	Yes	148	Rx18+		Third	Port 18 Rx +	No
24	Rx1-	Carrier	Third	Port 1 Rx -	Yes	147	Rx18-		Third	Port 18 Rx -	No
25	GND		First	Logic Ground	Yes	146	GND		First	Logic Ground	Yes

Table 5-1: AMC Connector Pinout (Continued)

Pin No.	Signal	Driven by	Mating	Pin Function on the Module	Used by AMC 308	Pin No.	Signal	Driven by	Mating	Pin Function on the Module	Used by AMC 308
26	GA2	Carrier	Second	Geographic Addr. 2	Yes	145	Tx17+		Third	Port 17 Tx +	No
27	PWR	Carrier	First	Payload Power	Yes	144	Tx17-		Third	Port 17 Tx -	No
28	GND		First	Logic Ground	Yes	143	GND		First	Logic Ground	Yes
29	Tx2+		Third	Port 2 Tx +	No	142	Rx17+		Third	Port 17 Rx +	No
30	Tx2-		Third	Port 2 Tx -	No	141	Rx17-		Third	Port 17 Rx -	No
31	GND		First	Logic Ground	Yes	140	GND		First	Logic Ground	Yes
32	Rx2+		Third	Port 2 Rx +	No	139	TCLKD +	Module	Third	TCLKD +	No
33	Rx2-		Third	Port 2 Rx -	No	138	TCLKD -	Module	Third	TCLKD -	No
34	GND		Firs	Logic Ground	Yes	137	GND		First	Logic Ground	Yes
35	Tx3+		Third	Port 3 Tx +	No	136	TCLKC +	Carrier	Third	TCLKC +	No
36	Tx3-		Third	Port 3 Tx -	No	135	TCLKC -	Carrier	Third	TCLKC -	Yes
37	GND		First	Logic Ground	Yes	134	GND		First	Logic Ground	Yes
38	Rx3+		Third	Port 3 Rx +	No	133	Tx15+		Third	Port 15 Tx +	No
39	Rx3-		Third	Port 3 Rx -	No	132	Tx15-		Third	Port 15 Tx -	No
40	GND		First	Logic Ground	Yes	131	GND		First	Logic Ground	Yes
41	ENAB LE#	Carrier	Second	AMC Enable	Yes	130	Rx15+		Third	Port 15 Rx +	No
42	PWR	Carrier	First	Payload Power	Yes	129	Rx15-		Third	Port 15 Rx -	No
43	GND		First	Logic Ground	Yes	128	GND		First	Logic Ground	Yes
44	Tx4+	Module	Third	Port 4 Tx +	Yes	127	Tx14+		Third	Port 14 Tx +	No
45	Tx4-	Module	Third	Port 4 Tx -	Yes	126	Tx14-		Third	Port 14 Tx -	No
46	GND		First	Logic Ground	Yes	125	GND		First	Logic Ground	Yes
47	Rx4+	Carrier	Third	Port 4 Rx +	Yes	124	Rx14+		Third	Port 14 Rx +	No
48	Rx4-	Carrier	Third	Port 4 Rx -	Yes	123	Rx14-		Third	Port 14 Rx -	No
49	GND		First	Logic Ground	Yes	122	GND		First	Logic Ground	Yes
50	Tx5+	Module	Third	Port 5 Tx +	Yes	121	Tx13+		Third	Port 13 Tx +	No
51	Tx5-	Module	Third	Port 5 Tx -	Yes	120	Tx13-		Third	Port 13 Tx -	No
52	GND		First	Logic Ground	Yes	119	GND		First	Logic Ground	Yes
53	Rx5+	Carrier	Third	Port 5 Rx +	Yes	118	Rx13+		Third	Port 13 Rx +	No
54	Rx5-	Carrier	Third	Port 5 Rx -	Yes	117	Rx13-		Third	Port 13 Rx -	No
55	GND		First	Logic Ground	Yes	116	GND		First	Logic Ground	Yes
56	SCL_ LIPMI Agent	Carrier	Second	IPMB-L Clock	Yes	115	Tx12+		Third	Port 12 Tx +	No
57	PWR	Carrier	First	Payload Power	Yes	114	Tx12-		Third	Port 12 Tx -	No
58	GND		First	Logic Ground	Yes	113	GND		First	Logic Ground	Yes
59	Tx6+	Module	Third	Port 6 Tx +	Yes	112	Rx12+		Third	Port 12 Rx +	No
60	Tx6-	Module	Third	Port 6 Tx -	Yes	111	Rx12-		Third	Port 12 Rx -	No
61	GND		First	Logic Ground	Yes	110	GND		First	Logic Ground	Yes
62	Rx6+	Carrier	Third	Port 6 Rx +	Yes	109	Tx11+		Third	Port 11 Tx +	No
63	Rx6-	Carrier	Third	Port 6 Rx-	Yes	108	Tx11-		Third	Port 11 Tx -	No

Table 5-1: AMC Connector Pinout (Continued)

Pin No.	Signal	Driven by	Mating	Pin Function on the Module	Used by AMC 308	Pin No.	Signal	Driven by	Mating	Pin Function on the Module	Used by AMC 308
64	GND		First	Logic Ground	Yes	107	GND		First	Logic Ground	Yes
65	Tx7+	Module	Third	Port 7 Tx +	Yes	106	Rx11+		Third	Port 11 Rx +	No
66	Tx7-	Module	Third	Port 7 Tx -	Yes	105	Rx11-		Third	Port 11 Rx -	No
67	GND		First	Logic Ground	Yes	104	GND		First	Logic Ground	Yes
68	Rx7+	Carrier	Third	Port 7 Rx +	Yes	103	Tx10+		Third	Port 10 Tx +	No
69	Rx7-	Carrier	Third	Port 7 Rx -	Yes	102	Tx10-		Third	Port 10 Tx -	No
70	GND		First	Logic Ground	Yes	101	GND		First	Logic Ground	Yes
71	SDA_LIPMI Agent	Both	Second	IPMB-L Data	Yes	100	Rx10+		Third	Port 10 Rx +	No
72	PWR	Carrier	First	Payload Power	Yes	99	Rx10-		Third	Port 10 Rx -	No
73	GND		First	Logic Ground	Yes	98	GND		First	Logic Ground	Yes
74	TCLK A+	Carrier	Third	TCLKA +	Yes	97	Tx9+		Third	Port 9 Tx +	No
75	TCLK A-	Carrier	Third	TCLKA -	Yes	96	Tx9-		Third	Port 9 Tx -	No
76	GND		First	Logic Ground	Yes	95	GND		First	Logic Ground	Yes
77	TCLK B+	Module	Third	TCLKB +	Yes	94	Rx9+		Third	Port 9 Rx +	No
78	TCLK B-	Module	Third	TCLKB -	Yes	93	Rx9-		Third	Port 9 Rx -	No
79	GND		First	Logic Ground	Yes	92	GND		First	Logic Ground	Yes
80	FCLK A+	Carrier	Third	FCLKA +	Yes	91	Tx8+		Third	Port 8 Tx +	No
81	FCLK A-	Carrier	Third	FCLKA -	Yes	90	Tx8-		Third	Port 8 Tx -	No
82	GND		First	Logic Ground	Yes	89	GND		First	Logic Ground	Yes
83	PS0#	Carrier	Last	Presence 0	Yes	88	Rx8+		Third	Port 8 Rx +	No
84	PWR	Carrier	First	Payload Power	Yes	87	Rx8-		Third	Port 8 Rx -	No
85	GND		First	Logic Ground	Yes	86	GND		First	Logic Ground	Yes

Front Panel Connectors

The AMC308 includes the following front panel connectors:

- “RS232 Serial Console Port J1,” on page 68
- “T1/E1/J1 Interfaces J2-J5,” on page 70

Figure 5-1, “AMC308 Connector Locations (Bottom and Front),” on page 64 and Figure 5-2, “AMC308 Connector Locations (Top),” on page 64 show the locations of these connectors.

RS232 Serial Console Port J1

The front panel console port is a modified Micro USB Type B connector with RS232 signal levels and 15KV ESD protection. It is pinned for DTE operation.

See Figure 5-1, “AMC308 Connector Locations (Bottom and Front),” on page 64 to identify the connector. Table 5-2, “J1 Serial Console Port Pinout,” shows the signals on this connector.

Table 5-2: J1 Serial Console Port Pinout

Pin	Signal	Name	Connection
1	-	NC	-
2	Input	RxD	Rx Data
3	Output	TxD	Tx Data
4	GND	Ground	Signal Ground
5	-	NC	-

Console Cable

A console cable (PT model number PT-ACC308-12388) is available to provide a modified male Micro USB to male DB9 connector. The Micro USB to DB9 console cable contains an internal null modem function and can be connected directly to a standard PC male DB-9 (EIA-574) serial I/O connector. [Figure 5-3](#) shows the console cable and [Table 5-3](#) shows the cable's connector pinouts and the internal null modem wiring.

Note: The table entries are made with respect to the cable/console signals, not the PC port signals.

Figure 5-3: DB9 Console Cable



Table 5-3: DB9 to Micro USB Console Cable Printout

DB9	Cable I/O	Cable Serial Protocol Name	Micro USB
1	Output	DSR (107 Data Set Ready from pin DB9-4) (Drives PC Carrier Detect)	NC
2	Output	TX (103 Transmit Data)	3
3	Input	RX (104 Receive Data)	2
4	Input	DSR (107 Data Set Ready) (From PC Data Terminal Ready))	NC
5	-	GND (102 Signal Ground)	4
6	Output	DSR (107 Data Set Ready from pin DB9-4) (Drives PC Data Set Ready)	NC
7	Input	CTS (106 Clear to Send) (From PC Request To Send)	NC
8	Output	CTS (106 Clear to Send from pin DB9-7) (Drives PC Clear To Send)	NC
9		Unused	NC
NC		Unused	1
NC		Unused	5

T1/E1/J1 Interfaces J2-J5

Four proprietary RJ48C connectors provide eight T1/E1/J1 interfaces via the front panel connectors J2 to J5 on the AMC308. See [Figure 5-2, “AMC308 Connector Locations \(Top\),” on page 64](#).

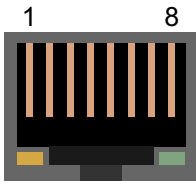
[Table 5-4](#) shows the two ports mapped to each RJ48C connector.

Table 5-4: RJ48C Connector Port Assignments

RJ48C Connector	Ports
J2	1, 5
J3	2, 6
J4	3, 7
J5	4, 8

[Table 5-5](#) shows the pin assignments for each RJ48C connector.

Table 5-5: RJ48C Connector Pinout

RJ48C Pin	Name	Front View
1	RRING1 (1ST Port)	
2	RTIP1 (1ST Port)	
3	RRING2 (2nd Port)	
4	TRING1 (1ST Port)	
5	TTIP1 (1ST Port)	
6	RTIP2 (2nd Port)	
7	TRING2 (2nd Port)	
8	TTIP2 (2nd Port)	

Front Panel LEDs

For more information about the RJ48C LED indicators on the AMC308, see [“LED Indicators,” on page 28](#).

T1/E1/J1 Splitter Cable

A splitter cable (PT model number PT-ACC308-12387) is available to provide the ability to connect two T1/E1/J1 lines to one RJ48C port on the AMC308. The cable is made up of one male RJ48C connector on one end and two female RJ48C connectors on the other end. This cable is 6 inches in length (min.). See [Figure 5-4, “T1/E1/J1 Splitter Cable,” on page 71](#). [Table 5-6, “T1/E1/J1 Splitter Cable Wire Diagram,” on page 71](#) shows the pinout of the cable.

Figure 5-4: T1/E1/J1 Splitter Cable



Table 5-6: T1/E1/J1 Splitter Cable Wire Diagram

P1	Color Code	Cable Type	Color Code	P2
1	Orange/White		Orange/White	1
2	Orange		Orange	2
4	Blue/White		Blue/White	4
5	Blue		Blue	5
Sh ell	Shield		Shield	Sh ell
				P3
3	Orange/White		Orange/White	1
6	Orange		Orange	2
7	Blue/White		Blue/White	4
8	Blue		Blue	5
Sh ell	Shield		Shield	Sh ell

Internal Connectors

The AMC308 includes the following internal connectors:

- “Debug Port P1-P2,” on page 72
- “Mezzanine Connector P4 (AMC308/AMC328 Only),” on page 72

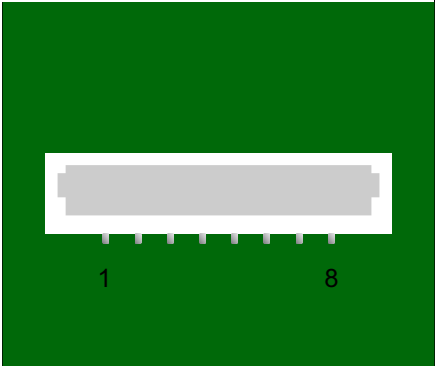
Figure 5-1, “AMC308 Connector Locations (Bottom and Front),” on page 64 and Figure 5-2, “AMC308 Connector Locations (Top),” on page 64 show the locations of these connectors.

Debug Port P1-P2

A 2 x 8-pin connector on the AMC308 provides access to the MPC8568 debug bus. See Figure 5-2, “AMC308 Connector Locations (Top),” on page 64.

Table 5-7 shows the signals on this connector, which have TTL electrical levels of 3.3 V.

Table 5-7: P1-P2 Debug Port

P1 Pin	Net	P2 Pin	Net	Top View
1	CPU1_TDO	1	NO CONNECT	
2	CPU1_TDI	2	COP_TRST_N	
3	COP_RUN_STOP_N	3	V3P3_COP_VDD_SENSE	
4	CPU1_TCK	4	CPU1_CKSTPI_N	
5	CPU1_TMS	5	ICE_EN_N (tie to GND)	
6	COP_SRST_N	6	GND	
7	COP_HRST_N	7	NO CONNECT	
8	CPU1_CKSTPO_N	8	GND	

Mezzanine Connector P4 (AMC308/AMC328 Only)

The mezzanine connector, P4, is a proprietary 200-pin connector used for interfacing with the AMC328 mezzanine card. See Figure 5-1, “AMC308 Connector Locations (Bottom and Front),” on page 64.

Table 5-8: P4 Mezzanine Connector Pinout

Pin	I/O	Name	Pin	I/O	Name	Pin	I/O	Name	Pin	I/O	Name
1	Out	DC_OPT0	51	I/O	PCI_CBE0_N	101	In	3.3V	151	Out	DC_TDO
2	In	DC_DET1	52	Out	GND	102	I/O	PCI_AD10	152	-	NC
3	Out	DC_OPT1	53	In	3.3V	103	I/O	PCI_STOP_N	153	-	NC
4	Out	GND	54	I/O	PCI_AD13	104	I/O	PCI_PER R_N	154	Out	GND
5	In	3.3V	55	I/O	PCI_AD5	105	I/O	PCI_AD9	155	In	3.3V
6	I/O	DC_TRDA_P	56	I/O	PCI_AD11	106	Out	GND	156	-	NC
7	Out	DC_OPT2	57	I/O	PCI_M66EN	107	In	3.3V	157	In	DC_PHY_AD0
8	I/O	DC_TRDA_N	58	Out	GND	108	In	DC_PCIC LK	158	-	NC

Table 5-8: P4 Mezzanine Connector Pinout (Continued)

Pin	I/O	Name	Pin	I/O	Name	Pin	I/O	Name	Pin	I/O	Name
9	Out	DC_PGOOD	59	In	3.3V	109	I/O	PCI_AD8	159	In	DC_PHY_AD3
10	Out	GND	60	I/O	PCI_AD15	110	In	DC_PCIR ST_N	160	Out	GND
11	In	3.3V	61	I/O	PCI_TRDY_N	111	I/O	PCI_AD3	161	In	3.3V
12	I/O	DC_TRDB_N	62	I/O	PCI_DEVS EL_N	112	Out	GND	162	-	NC
13	Out	DC_REV0	63	I/O	PCI_AD16	113	In	3.3V	163	In	DC_PHY_AD1
14	I/O	DC_TRDB_P	64	Out	GND	114	I/O	PCI_AD1	164	-	NC
15	Out	DC_REV1	65	In	3.3V	115	In	PCI_AD14	165	In	DC_PHY_AD4
16	Out	GND	66	I/O	PCI_AD22	116	-	NC	166	Out	GND
17	In	3.3V	67	I/O	PCI_IRDY_N	117	Out	PCI_CBE1_N	167	In	3.3V
18	I/O	DC_TRDC_P	68	I/O	PCI_AD25	118	Out	GND	168	-	NC
19	-	NC	69	I/O	PCI_PAR	119	In	3.3V	169	In	DC_PHY_AD2
20	I/O	DC_TRDC_N	70	Out	GND	120	Out	STI_4	170	-	NC
21	-	NC	71	In	3.3V	121	In	STIO_4	171	-	NC
22	Out	GND	72	I/O	PCI_AD18	122	Out	STI_5	172	Out	GND
23	In	3.3V	73	I/O	PCI_AD26	123	In	STIO_5	173	In	3.3V
24	I/O	DC_TRDD_N	74	I/O	PCI_FRA ME_N	124	Out	GND	174	-	NC
25	-	NC	75	I/O	PCI_AD30	125	In	3.3V	175	-	NC
26	I/O	DC_TRDD_P	76	Out	GND	126	Out	STI_6	176	-	NC
27	-	NC	77	In	3.3V	127	In	STIO_6	177	-	NC
28	Out	GND	78	I/O	PCI_AD29	128	Out	STI_7	178	Out	GND
29	In	3.3V	79	In	PCI_GNT0_N	129	In	STIO_7	179	In	3.3V
30	Out	DC_ENAB	80	I/O	PCI_AD20	130	Out	GND	180	-	NC
31	In	PHY_MDC	81	I/O	PCI_AD31	131	In	3.3V	181	-	NC
32	-	NC	82	Out	GND	132	In	DC_TDM_LCK0	182	-	NC
33	I/O	PHY_MDIO	83	In	3.3V	133	In	DC_C2_C LK	183	-	NC
34	Out	GND	84	I/O	PCI_SERR_N	134	In	DC_FSYN C0_N	184	Out	GND
35	In	3.3V	85	I/O	PCI_AD27	135	In	DC_C16_CLK	185	In	3.3V
36	-	NC	86	I/O	PCI_CBE2_N	136	Out	GND	186	-	NC
37	In	DC_PHY_RST_N	87	Out	PCI_REQ0_N	137	In	3.3V	187	-	NC
38	-	NC	88	Out	GND	138	-	NC	188	-	NC
39	Out	DC_PHY_INT_N	89	In	3.3V	139	In	PYLD_TR ST_N	189	-	NC
40	Out	GND	90	I/O	PCI_AD24	140	-	NC	190	Out	GND
41	In	3.3V	91	I/O	PCI_AD19	141	In	PYLD_TC K	191	In	3.3V
42	Out	PCI_INTA_N	92	I/O	PCI_AD28	142	Out	GND	192	-	NC
43	I/O	PCI_AD12	93	I/O	PCI_CBE3_N	143	In	3.3V	193	-	NC
44	I/O	PCI_AD4	94	Out	GND	144	-	NC	194	-	NC
45	I/O	PCI_AD6	95	In	3.3V	145	In	ITDM_TD O	195	-	NC
46	Out	GND	96	I/O	PCI_AD23	146	-	NC	196	Out	GND
47	In	3.3V	97	In	PCI_DC_I DSEL	147	In	PYLD_TM S	197	In	3.3V
48	I/O	PCI_AD2	98	I/O	PCI_AD21	148	Out	GND	198	Out	DC_DET 2_N
49	I/O	PCI_AD0	99	I/O	PCI_AD17	149	In	3.3V	199	-	NC
50	I/O	PCI_AD7	100	Out	GND	150	-	NC	200	-	NC

Switch and Jumper Configuration

The AMC308 includes several options that tailor the operation of the module. Most of the options are selected through software; however, some options cannot be software controlled and are configured with switches and jumpers. Closing or opening the desired switch or jumper sets each option.

Switch Locations

The AMC308 includes the following switches:

- SW1 - a single bank of eight switches (SW1-1, SW1-2 ... SW1-8) which configure the PCI Express port on the module. See [Figure 5-5, "Switch Bank SW1," on page 75](#) for the location of these switches on the module.
- Reset switch. See [Figure 5-1, "AMC308 Connector Locations \(Bottom and Front\)," on page 64](#) for the location of this switch on the module.
- Hot-swap handle switch. See [Figure 5-1, "AMC308 Connector Locations \(Bottom and Front\)," on page 64](#) for the location of this switch on the module.

Switch Descriptions

The following sections present the switches in numerical order and provide a description of each switch bank, switch number, and setting. Multiple-switch banks are identified in the form **SWx-N**, where **x** is the bank number and **N** is the switch number. For example, SW1-3 means "bank number 1, switch number 3".

Each switch is either ON (closed) or OFF (open). Each bank is labeled to indicate the switch number and the ON or OFF position.

Notes:

- *The factory default switch settings are indicated below in bold.*
- *Some switches are interdependent. When the setting of one switch is dependent on another, that dependency is noted.*

SW1 (PCI Express Port Configuration)

SW1 is an eight-position DIP switch. See [Figure 5-5](#) for a detailed illustration of SW1. SW1 signals the PCI Express port configuration features to the MMC for initial port configuration. This configuration is overridden by any FRU guidance.

SW1-1: ON signals the MMC that the PCI Express port is to be used as a root complex on the PCI Express bus. **OFF** indicates that it is to be an endpoint.

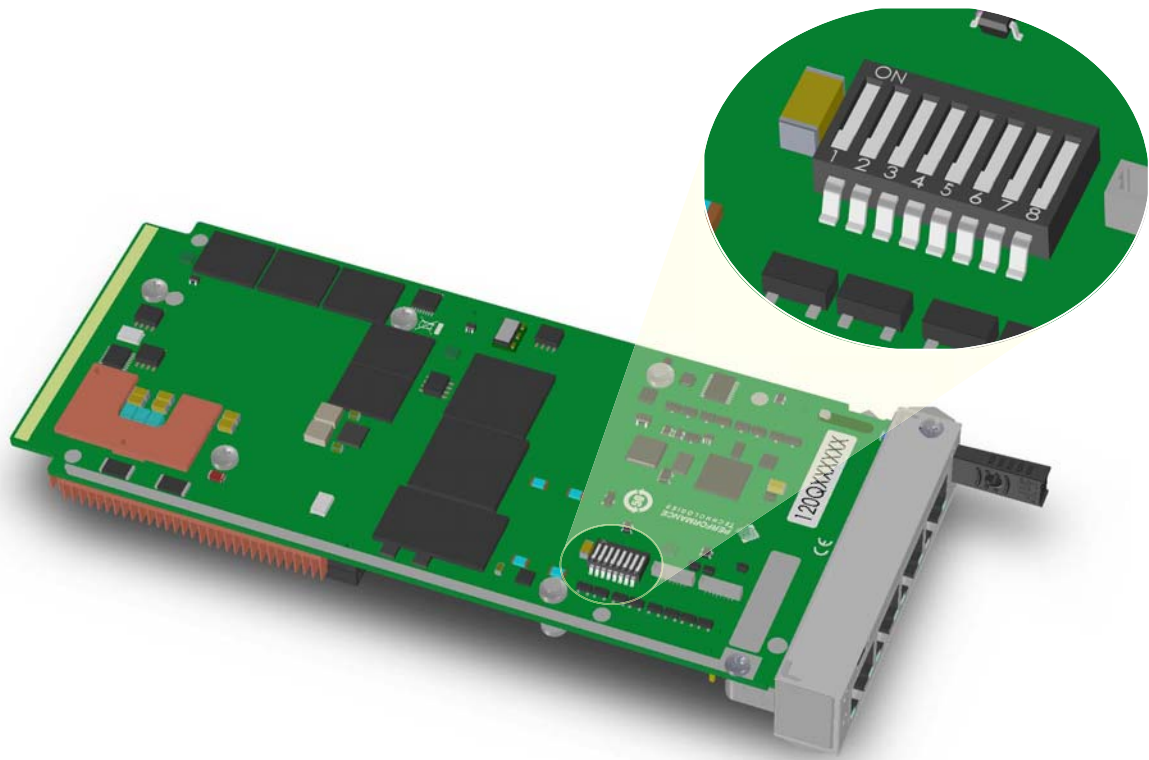
SW1-2: ON (default) configures the AMC308 to source/receive/isolate the PCI Express clock (FCLKA) based on e-keying commands in compliance with AMC.1 R2.0. **OFF** configures the AMC308 to receive the PCI Express clock (FCLKA) from the backplane regardless of e-keying commands. Set this switch to OFF for use in AMC.1 R1.0 carriers.

If the AMC308 does not boot up when powered on, it is likely that FCLKA is not configured properly for the specific carrier. For more information about configuring FCLKA on this AMC, please contact PT's Customer Support (see ["Customer Support and Services," on page 12](#)).

SW1-3: ON indicates that the board supplies a spread spectrum clock if required by the system. An **OFF** condition disables spread spectrum clocking.

SW1- 4 through SW1-8: Factory reserved. THESE SWITCHES MUST BE LEFT **OFF**.

Figure 5-5: Switch Bank SW1



Reset Switch

The reset switch is located behind the faceplate. It is accessed through a small hole in the faceplate located next to the reset glyph. See [“AMC308 Connector Locations \(Bottom and Front\),” on page 64](#) for the location. A small cylindrical tool such as a paper clip can be used to activate the switch. The switch forces the MPC8568 processor into a hard reset. The MPC8568 remains in hard reset as long as the switch is depressed.

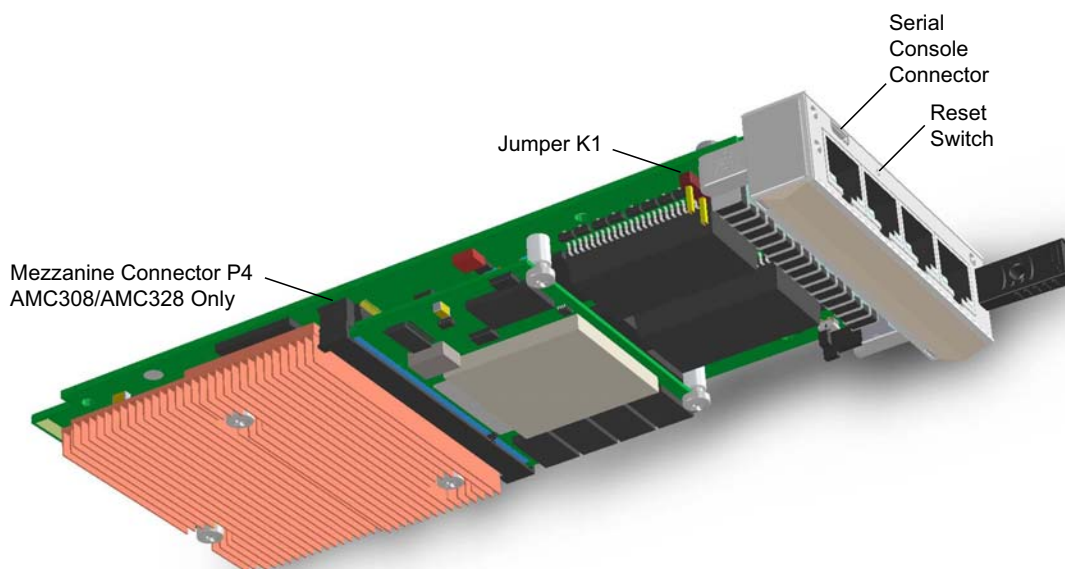
Hot-Swap Switch

The AMC308 provides a hot-swap handle on its front panel. See [Figure 5-1, “AMC308 Connector Locations \(Bottom and Front\),” on page 64](#). This handle is attached to a mechanical latching mechanism and to the hot-swap switch. When this switch opens or closes it sends a request via the MMC to the carrier for a hot-swap extraction or insertion. Its function and behavior is defined by the PICMG AMC.0 specification. See the topic [“PICMG Specifications,” on page 86](#), for a link to this publication. The hot-swap LED indicates the state of the module during extraction and insertion. See the topic [“LED Indicators,” on page 28](#), for more information. Also see [“Installing the AMC308”](#) and [“Removing the AMC308,” on page 33](#).

Jumper K1

The AMC308 includes a single internal jumper, K1, on the bottom side of the board. [Figure 5-6](#) shows its location. K1, when installed, is used to connect the frame ground to the logic ground. It is normally left in the off or parked position (jumper connector installed on one of the two posts). This disconnects logic ground from frame ground.

Figure 5-6: AMC308 Jumper K1 Location



Overview

This chapter describes the electrical, environmental, and mechanical specifications of the AMC308. Reliability information is also provided in this chapter.

Key topics in this chapter include:

- [“Absolute Maximum Ratings,” on page 77](#)
- [“Electrical and Thermal Specifications,” on page 78](#)
- [“Mechanical Specifications,” on page 79](#)
- [“Reliability,” on page 80](#)

Absolute Maximum Ratings

The values below are stress ratings only. Do not operate the AMC308 at these maximums.

Supply Voltage, Vcc12 (+12 V):	10 - 14 V
Supply Voltage, Vcc3 (+3.3 V):	3.0 - 3.6 V
Operating Temperature:	0 to 55 °C (32 to 131 °F)
Storage Temperature:	-40 to +80 °C (-40 to 176 °F)
Relative Humidity:	5 to 95% RH non-condensing
Altitude:	0 to 15,000 feet

Electrical and Thermal Specifications

This section describes the electrical and thermal requirements for the AMC308.

Power Requirements

The power distribution network on the AMC308 starts with the AMC card edge interface connecting to an AdvancedTCA or MicroTCA-based platform. The power pins are connected per the *PICMG Advanced Mezzanine Card AMC.0 Specification R2.0*. The voltages supplied are +12 V and +3.3 V (management power used only for the IPMI controller).

Table 6-1, “Power Consumption with 1 GHz Processor,” shows total power consumption of an AMC308 with an MPC8568 PowerQUICC III 32-bit RISC processor and 512 MB of DDR2 SDRAM on SODIMM installed.

Table 6-1: Power Consumption with 1 GHz Processor

Product	Maximum Current		Maximum Power	
	3.3V	12V	3.3V	12V
PT-AMC308-12292	78mA	1.67A	.26W	20W
PT-AMC318-12354	78mA	1.75A	.26W	21W
PT-AMC328-12355	78mA	2.29A	.26W	27.5W
	Typical Current		Typical Power	
	3.3V	12V	3.3V	12V
PT-AMC308-12292	24mA	1.25A	80mW	15W
PT-AMC318-12354	24mA	1.33A	80mW	16W
PT-AMC328-12355	24mA	1.67A	80mW	20W



Caution:

Use anti-static grounding straps and anti-static mats when handling the AMC308 to help prevent damage due to electrostatic discharge. Electronic components on printed circuit boards are extremely sensitive to static electricity. Ordinary amounts of static electricity generated by your clothing or work environment can damage the electronic equipment.

Thermal Specifications

This section describes the thermal requirements for the AMC308.

Operating Temperature

The operating temperature range is 0 to 55 °C (32 to 131 °F). The AMC308 comes from the factory with an integrated heat sink to help dissipate the heat generated by the MPC8568 processor. The maximum ambient air temperature assumes airflow of 300 linear feet per minute (LFM) past the heat sink.



Caution:

External airflow must be provided at all times during operation to avoid damaging the CPU.

Temperature Monitoring

Two thermal sensors are provided on the component side of the AMC308: CPU temperature and Inlet temperature. Because reliable long-term operation of the AMC308 depends on maintaining proper temperature, PT strongly recommends that you verify the operating temperature of the CPU.

The MMC monitors the temperature of the device and reports any temperature violations that may occur via the IPMB interface. See [“Sensors,” on page 43](#) for more information.

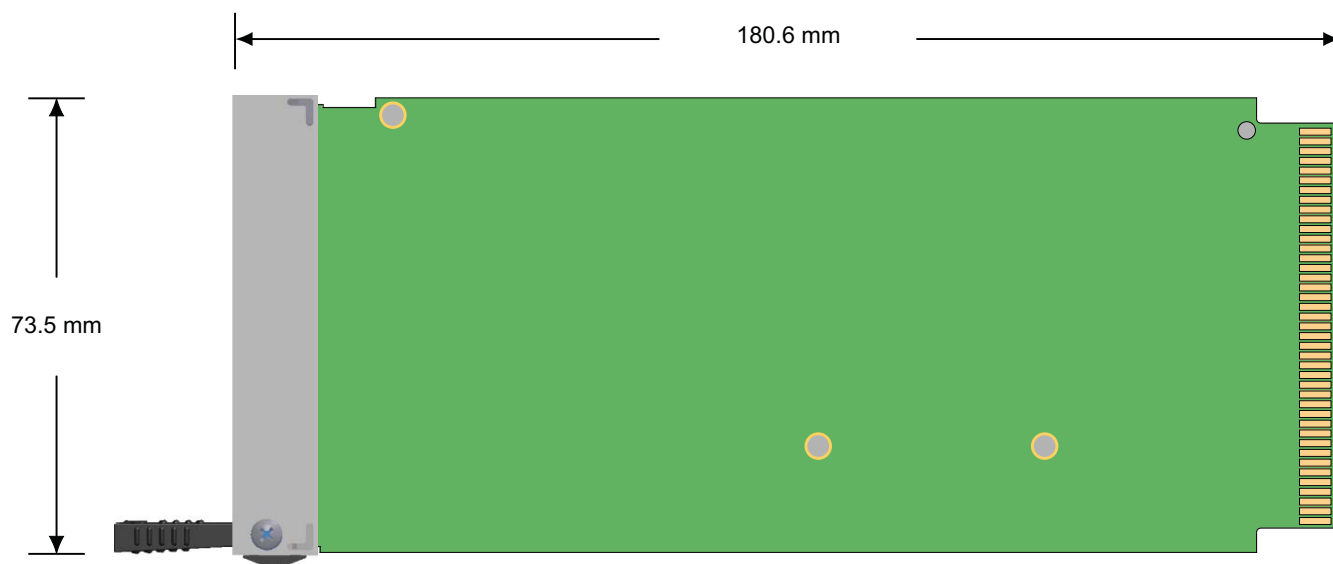
Mechanical Specifications

The AMC308 is compliant with the *PICMG AMC.0 R 2.0* specification for all mechanical parameters. The AMC308 module is a hot-swappable single mid-size module.

Mechanical dimensions are outlined below and shown in [Figure 6-1, “AMC308 Dimensions,”](#) below.

Board Length:	180.6 mm (7.11 in)
Board Width:	73.5 mm (2.89 in)
Board Height:	18.96 mm (0.75 in)
Board Weight:	0.309 kg (10.9 oz) AMC308 with mid-size front panel and heat sink loaded
	0.309 kg (10.9 oz) AMC318 with mid-size front panel and heat sink loaded
	0.338 kg (11.9 oz) AMC328 with mid-size front panel and heat sink loaded

Figure 6-1: AMC308 Dimensions



Reliability

The following reliability tests have been performed for the AMC308:

MTBF	263,505 hours per Bellcore (Telecordia) SR-332 Issue 1
MTTR	3 minutes

Overview

This chapter presents agency approval and certification information for the AMC308 processor AMC module. Key topics in this chapter include:

- “Network Equipment-Building System (NEBS) and European Telecommunications Standards Institute (ETSI),” on page 81
- “CE Certification,” on page 81
- “EN55022 Radiated and Conducted Emissions,” on page 82
- “EN300 386 Electromagnetic Compatibility (EMC),” on page 82
- “EN55024 Immunity,” on page 82
- “Safety,” on page 82
- “FCC (USA) Class A Notice,” on page 82
- “Industry Canada Class A Notice,” on page 83
- “Product Safety Information,” on page 83
- “Compliance with RoHS and WEEE Directives,” on page 84

Network Equipment-Building System (NEBS) and European Telecommunications Standards Institute (ETSI)

The product described in this manual is designed to meet NEBS Level 3 and ETSI Environmental Criteria:

- GR-63-CORE - *Network Equipment-Building System Requirements: Physical Protection*
- GR-1089-CORE - *Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment*

CE Certification

The product described in this manual meets the intent of the following European Union Directives:

- *EU 89/336/EEC Electromagnetic Compatibility Directive*, amended by 92/31/EEC, 93/68/EEC, 98/13/EEC, and 2004/108/EC
- *EU 72/23/EEC Low Voltage Directive*, amended by 93/68/EEC and 2006/95/EC

by meeting the applicable EU standards as outlined in the *Declaration of Conformance*. The *Declaration of Conformance* is available from Performance Technologies, or from your authorized distributor. Compliance will be demonstrated to the following specifications as listed in the *Official Journal of the European Communities*.

EN55022 Radiated and Conducted Emissions

EN300 386 Electromagnetic Compatibility (EMC)

EN55024 Immunity

EN61000-4-2	Electro-Static Discharge (ESD)
EN61000-4-3	Radiated Susceptibility
EN61000-4-4	Electrical Fast Transient Burst
EN61000-4-5	Surge Immunity
EN61000-4-6	Frequency Magnetic Fields
EN61000-4-11	Voltage Dips, Variations, and Short Interruptions

Safety

The product described in this manual meets the following safety regulations:

EN/IEC 60950	Safety Requirements for Information Technology Equipment
CB Scheme	CB Scheme Certificate and Report
UL60950	UL Recognized

FCC (USA) Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: Modifications made to this device that are not approved by Performance Technologies, Inc. may void the authority granted to the user by the FCC to operate this equipment.

Industry Canada Class A Notice

This Class A digital apparatus complies with Industry Canada's Equipment Standard for Digital Equipment (ICES-003).

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Product Safety Information

Safety Precautions

Review the following precautions to avoid injury and prevent damage to this product, or any products to which it is connected. To avoid potential hazards, use the product only as specified.

Read all safety information provided in the component product user manuals and understand the precautions associated with safety symbols, written warnings, and cautions before accessing parts or locations within the unit. Save this document for future reference.



Caution:

To Avoid Burns: *If there is a heat sink on this module, it can get very hot during normal operation. To avoid burns, take extra care when removing the module from the chassis soon after shutdown. Wait a few minutes to allow the heat sink to cool down.*



Caution:

Handling the Module: *It is important to hold the module only by the front panel or PCB edges. Avoid touching any components unless necessary to service the product. Do not handle the heat sink, as this can adversely affect the thermal connection between the heat sink and the processor, and cause the processor to overheat under normal operating conditions.*



Caution:

To Avoid Electric Overload: *To avoid electrical hazards (heat, shock and/or fire hazard), do not make connections to terminals outside the range specified for that terminal. Refer to the product user manual for correct connections.*



Caution:

To Avoid the Risk of Electric Shock: *When supplying power to the system, always make connections to a grounded main. Always use a power cable with a grounded plug (third grounding pin). Do not operate in wet, damp, or condensing conditions.*



Caution:

System Airflow Requirements: Platform components such as processor boards, Ethernet switches, etc., are designed to operate with external airflow. Components can be destroyed if they are operated without external airflow. Chassis fans normally provide external airflow when components are installed in compatible chassis. Filler panels must be installed over unused chassis slots so that airflow requirements are met. Please refer to the product data sheet for airflow requirements if you are installing components in custom chassis.



Caution:

Do Not Operate Without Covers: To avoid electric shock or fire hazard, do not operate this product with any removed enclosure covers or panels.



Caution:

To Avoid the Risk of Electric Shock: Do not operate in wet, damp, or condensing conditions.



Caution:

Do Not Operate in an Explosive Atmosphere: To avoid injury, fire hazard, or explosion, do not operate this product in an explosive atmosphere.



Caution:

If Your System Has Multiple Power Supply Sources: Disconnect all external power connections before servicing.



Warning:

System power supplies must be replaced by qualified service personnel only.

Compliance with RoHS and WEEE Directives

In February 2003, the European Union issued *Directive 2002/95/EC* regarding the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS) and *Directive 2002/96/EC* on Waste Electrical and Electronic Equipment (WEEE).

This product is compliant with *Directive 2002/95/EC*. It may also fall under the *Directive 2002/96/EC*.

PT's complete position statements on the RoHS and WEEE Directives can be viewed on the Web at: <http://pt.com/page/about-us/ehsms/>.

Overview

This chapter provides information on data sheets, devices, standards, specifications, and documentation for the technology designed into the AMC308.

Key topics in this chapter:

- “Ethernet Interfaces,” on page 85
- “I-TDM (AMC318 Only),” on page 85
- “Module Management Controller,” on page 85
- “MPC8568 PowerQUICC III Processor,” on page 86
- “OCTALFALC T1/E1/J1 Framer,” on page 86
- “PCI Express Specifications,” on page 86
- “PICMG Specifications,” on page 86
- “User Documentation,” on page 86
- “Voice and Media Processor (AMC328 Only),” on page 87

Ethernet Interfaces

Ethernet is implemented on the AMC308 via the Broadcom BCM5389 8-GbE port Switch with Integrated SerDes. For more information about this device, refer to the Broadcom Web site:

<http://www.broadcom.com/products/Small-Medium-Business/Gigabit-Ethernet-Switching-Products/BCM5389>

I-TDM (AMC318 Only)

For more information about the Accolade Scalable I-TDM Macrocell (ASTDM) implementation of I-TDM used on the AMC318, refer to the following document available at the Accolade Web site:

<http://www.accoladetechnology.com>

Module Management Controller

The MMC is implemented with Atmel's ATmega128L-8MU microcontroller with 128 KB in-system programmable flash. For more information about this device, refer to the Atmel Web site:

http://www.atmel.com/dyn/products/product_card.asp?part_id=2018

Refer to the Intel IPMI home page for information concerning the Intelligent Platform Management Interface, including the *Intelligent Platform Management Interface v1.5 Specification* and the *Intelligent Platform Management Interface Implementer's Guide*:

<http://developer.intel.com/design/servers/ipmi/spec.htm>

MPC8568 PowerQUICC III Processor

The AMC308/318/328 uses a Freescale MPC8568 PowerQUICC III Processor. For more information about the MPC8568, refer to the *MPC8568E/MPC8567E PowerQUICC III Integrated Processor Hardware Specifications* at the Freescale Web site:

<http://www.freescale.com/>

OCTALFALC T1/E1/J1 Framer

The AMC308 incorporates an Infineon Technologies OCTALFALC four-port T1/E1/J1 framer and line interface unit (PEF22558). More information on the OCTALFALC may be found at the Infineon Technologies Web site:

<http://www.infineon.com/cms/en/product/index.html>

PCI Express Specifications

The following PCI Express specifications can be purchased from the PCI-SIG. Short form specifications in Adobe Acrobat format (PDF) are also available at the PCI-SIG Web site:

<http://www.pcisig.com/specifications/>

- *PCI Local Bus Specification, Revision 2.2*, 1998. PCI Special Interest Group.
- *PCI Express Base Specification Revision 1.0*. PCI Special Interest Group
- *PCI Express Card Electromechanical Specification Revision 1.0*. PCI Special Interest Group

PICMG Specifications

The AMC308 is compliant with the following PICMG specifications:

- *PICMG AMC.0 R2.0 Advanced Mezzanine Card Base Specification*
- *PICMG AMC.1 PCI Express and Advanced Switching on AdvancedMC*
- *PICMG AMC.2 AMC Gigabit Ethernet/10 Gigabit XAUI Ethernet*
- *PICMG SFP.1 Revision 1.0 Internal TDM*

These specifications can be purchased from PICMG. A short-form specification is also available at PICMG's Web site:

<https://www.picmg.org>

User Documentation

The latest product information and user manuals are available at the PT Web site:

<http://www.pt.com>

Information specific to the AMC308 is available at this Web page:

<http://go.pt.com/amc308-318-328>

Voice and Media Processor (AMC328 Only)

The Centillium Communications Entropia™ III, VoIP System on-Chip Processor provides voice and media processing capability on the AMC328. For more information about the Entropia III, see the following Web site:

http://www.centillium.com/html/voip_spe_entropia_3.htm

